REPORT
AND
GENERAL CONSTRUCTION PLANS

PROJECT NOS. 2, 3, 4, 5, 6.

MILLER SLOUGH

JONES CREEK

PRINCEVALLE STORM DRAIN

LITTLE LLAGAS CREEK

SANTA CLARA COUNTY FLOOD CONTROL

AND

WATER CONSERVATION DISTRICT

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ENGINEER'S REPORT OF PROPOSED IMPROVEMENT FOR ZONE S-1 OF THE SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

(Project Nos. 2, 3, 4, 5 and 6)

INTRODUCTION

The following report recommends improvements to four streams and construction of an artificial drainage system, namely Upper and Lower Miller Slough, Jones (Alamias) Creek, Little Llagas Creek, and Princevalle Storm Drain. The report shows:

1. A general description of the work proposed to be done, together with general plans, profiles, cross sections and general specifications relating thereto, on each project constituting the improvement.

2. A general description of the lands, rights-of-way, easements and property proposed to be taken, acquired or injured in carrying out said work.

3. Maps which show the location of each of said projects constituting the improvement and land, rights-of- way easements, and property to be taken, acquired or injured in carrying out said work, and any information in regard to the same that is deemed necessary or useful.

4. An estimate of the cost of the improvement in Zone S-1 and each of the projects constituting the improvement, which includes an estimate of the cost of the land, rights of way, easements and property proposed to be taken, acquired or injured in carrying out said improvement, and also of all incidental expenses likely to be incurred in connection therewith, including legal, clerical, engineering, superintendence, inspection, printing and advertising.

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THE NATURE OF THE FLOOD CONTROL PROBLEM

Stated in its simplest terms, the Flood Control problem consists of transporting water from mountainous terrain where, during times of rain, water falls in greatest abundance, to the bay or ocean, in such a manner as to cause no damage or a minimum of damage en route. At the outset, it should be clearly understood that a flood control or flood control protection program should not be construed as a panacea which will insure against all flooding. Storms vary in amount of rainfall, duration and intensity of rainfall. Storms are sent to us by nature with little or no advance warning. They vary in size from the meager rain experienced in Santa Clara County in the winters of 1956-57 and 1958-59, to the destructive type of storm experienced during the "Christmas Flood" of 1955 and April of 1958. It seems certain that no matter how much flood protection is given to any area, there is a probability that some day a storm will occur that exceeds the capacity of the works to be built. There are, however, well accepted criteria which serve as a desirable guide in determining the amount of protection to be provided by the public agency when establishing a flood control or flood protection program. Storms are generally referred to as ten-year storms, fifteen-year storms, fifty-year storms, one-hundred year storms, etc. These designations have reference to the frequency with which storms and certain intensities occur. Thus, a 100-year storm is one which, it is estimated, will be excceeded on the average of once every 100 years. A 50-year storm is estimated to be excceeded on an average of once every 50 years. The designations refer to estimated times of recurrence, and are not to be confused with the relative sizes of the storm. Thus, a 100-year storm is not twice as big as a 50-year storm. In general, a 50-year storm is approximately 85% of the magnitude of a 100-year

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storm in this area.

While the South Zone remains primarily agricultural, a flood control program which provides protection against storms of the magnitude of 1955 and 1958 is suggested as a reasonable degree of protection at a reasonable cost. If we assume that all flood protection works have been established to contain such storms and a storm of greater frequency occurs, there would, of course, be some flooding; but in that event the amount of flooding would be of minor consequence, would cause little damage, and expenditure of funds to protect against the amount of damage caused would not be warranted. The protective works shown on the plans accompanying this report have been designed in accordance with these general principles, except the Princevalle Storm Drain, designed for a five (5) year frequency which is deemed adequate for this type of installation, draining an urban area with no run-off from the hills.

PROBLEMS CONNECTED WITH FLOOD CONTROL

The increasing intensive agricultural development of South Santa Clara County which we are experiencing, is one of the most important contributing factors to the flood control problem in this area. While land is in its natural condition, or has been cultivated into orchards, some inundation is not damaging; however, inundation of row crops can cause severe damage not only from the water but from the silt the water brings or takes away as it flows over the field. Increasing urban developments in the area also are, in many cases, subject to flooding and long periods of inundation at depths of 1 to 4 feet, causing severe damage.

In discussing main flood control channels, an analogy can be made to the freeway system for handling automobile traffic, since flood control channels are the main arterials for transporting water. In

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some respects they are easily compared. For instance, a bottleneck on a highway will cause a large backup of traffic. A channel bottleneck in the form of an undersized culvert, or a series of sharp curves, will also back up the water. However, here the similarity ends because as traffic backs up it slows down, but when water backs up it overflows the channel, causing flooding and damage. If a highway becomes congested, automobiles can leave the highways to take a side street, but when water leaves the main channel seeking its own "side street" it causes flooding and damage. Automobiles are controlled by the driver, but storms come with the speed at which nature sends them to us, and their speed cannot be controlled without the construction of proper protective works. Freeways can go uphill and downhill, whereas flood waters travel downhill only. Highways can be built in segments, with the realization and understanding that when the improved portion comes to an end, the smaller road will still be able to handle some of the traffic at a slower rate of speed without damage. This, of course, is not true in the case of flood control channels. They mustbe improved in the entire reach where the capacity is inadequate to give proper flood protection.

Aside from the usual problem of inadequate channel capacity, there are also the related problems of erosion, and silting, all of which must be considered in every proper flood protection program. If we trace runoff from the hillside on its course to the sea, the following things are likely to occur: First, flood waters, like most natural substances, rush with greater speed downhill on a steeper grade. Therefore, when the rain falls in the mountains the runoff rapidly traverses the steep hillside, washing away natural soils along with dust and silt that has gathered over the dry summer

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and fall months. Since it is travelling at a relatively fast rate of speed, it has a tendency to scour or erode. As the tributaries of a stream reach the main channel or outfall, a greater volume of water has gathered. Flood waters travelling at a high rate of speed in combination with volume create a greater force, which will continue to erode within the channel itself. This is particularly true where soils are loose or gravelly. These silts and gravels are carried downstream toward the floor of the valley. As the grade becomes flatter the speed of the water slows down. Having lost its velocity it has lost its ability to carry much of this silt and gravel, which is then deposited in the bed of the stream in the flatter reaches of the course of the river. Similar deposition of silts and gravels occur at each obstruction, such as at culverts or sharp turns in the bed of the creek which causes a reduction in the rate of travel of the water. In the case of an inadequate channel the water then leaves the channel and carries its debris and silt onto adjoining land. In this area many of the streams are on high ground or are leveed so that when the stream leaves its natural course it cannot return and lies in lakes throughout the area,or attempts to cut new channels causing severe erosion of fertile soils.

METHODS OF CORRECTING EROSION

There are many methods of solving the erosion problem; all of which have advantages and disadvantages. One of the best methods of preventing erosion is to construct a reinforced concrete channel section. Concrete lining is the obvious method of preventing erosion and has the advantage of reducing maintenance costs in the future. The disadvantages are high cost and the elimination of any possibility of percolation within our stream beds. Another method is to use drop structures or check dams. As stated previously, flood waters

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run at a highly erosive rate when the grade of the channel is quite steep. Drop structures or check dams have the effect of changing the grade of the stream bed by flattening the slope between structures with the structure itself acting as a spillway or waterfall within the stream channel. With the flatter slope between drop structures, erosion is limited to the areas at and near the drop structures and this can be corrected by concrete lining or sack revetment immediately upstream and downstream from the drop structure. In some cases it is necessary to place drop structures in wholly concrete-lined channels due to the fact that the speed of the water will, in the absence of drop structures, be capable of damaging even the concrete lining.

It is sometimes thought desirable to straighten channels that have a winding course. However, when such a channel is straightened, such straightening will have the effect of steepening the slope of the channel, creating an erosion problem as a result. Therefore, in the absence of sharp turns which would cause bottlenecks, it is sometimes desirable to refrain from channel straightening and shortening.

After considering the above problems, the Board of Supervisors of the Santa Clara County Flood Control and Water Conservation District adopted the following policies in connection with construction of major flood control facilities:

1. Pending availability of funds for channel lining, unlined channels will be constructed.

2. When funds are available, lined channels are preferred over unlined channels, and lining will be provided except in those areas where lining would adversely affect the percolation of water.

3. Drop structures are preferred over lining to control velocity and erosion.

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4. In channel reaches containing possible erosive velocities, but having reasonable alignment and adequate cross-section, the natural alignment of the water course is preferred over channel realignment.

METHODS FOR CORRECTING THE SILTING PROBLEM

Proper erosion control as outlined above, will prevent a major portion of the silting of the channels in the downstream portions. However, it is impossible to prevent channel silting completely. The only feasible method to maintain proper channel capacity is to remove the silt at periodic intervals. In most cases this will be accomplished by the maintenance forces of the Department of Public Works of the County of Santa Clara and in other cases, by the use of rented equipment obtained from private contractors.

SOLUTION OF PROBLEM

In view of the critical problems and expensive projects required to provide adequate channel capacity to flooding on the valley floor and attendant problems in upstream areas as well as the realization that flood control in itself is not the only problem to be considered, application has been made by the Loma Prieta Soil Conservation District as well as the South Santa Clara Valley Water Conservation District for Federal financial and planning assistance under United States Public Law 566. The report relating to this application is being presently prepared by the United States Department of Agriculture, Soil Conservation Service, in cooperation with the local agencies named above, and the State Soil Conservation Division.

The Federal program will consider fire protection, soil conservation, land treatment and water conservation as well as flood control facilities and will be a comprehensive work plan for the entire watershed of the Uvas and Llagas Creeks. It may include upstream

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storage or check dams for flood, erosion control and other purposes. It is hoped that the major portion of the work proposed by these plans and work on the main Llagas Creek will be undertaken and financed under Public Law 566. If local interests will press the Corps of Engineers, the Corps could probably be persuaded to complete their surveys on the Uvas, Pajaro and Pacheco and improve these streams to round out the program for the South County.

OTHER BASIC CONSIDERATIONS

In addition to the problems of channel capacity and erosion, there are other basic problems which must be kept in mind. These problems consist of channel depths, alignment,access for maintenance, severance damage caused to property owners, etc. Therefore, in developing a program which will provide proper flood control and drainage for a watershed, channel improvements for the main channels, (shown on the accompanying plans) have been planned for Zone S-1 with the following factors in mind:

1. Provide a waterway which will minimize erosion and be of adequate capacity to carry the runoff from fully developed land on the valley floor receiving precipitation from a storm estimated to occur on an average of once every 50 years; and to provide an additional safety factor (freeboard) in all cases.

2. Final alignment and capacity to fit the future development pattern of the area, and also to cause a minimum of property severance along the route of the stream. The lands, rights of way and easements, and property which will be injured or required to provide for the channels, conduits, levees and access will be of widths specified and shown on the accompanying plans.

3. Provide a means of ready access to the channel so that emergency and maintenance crews can take care of any exigency.

4. Design improvements within the economic limits reached when

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initial construction costs are balanced against future anticipated maintenance expense.

5. Provide channels of sufficient depth to accomodate future storm drains from remote areas of the basin.

6. Provide fencing where necessary to give adequate protection to the public.

7. To perform all work in accordance with acceptable construction practices, and therefore general specifications for all excavation, pipe, reinforced concrete structures and miscellaneous construction shall be according to Santa Clara County standards, Soil Conservation Standards, Bureau of Reclamation Standards, and the provisions of the "Standard Specifications of the State of California, Department of Public Works, Division of Highways".

THE SPECIFIC PROGRAM FOR THE SOUTH ZONE

A. The South Zone consists of a portion of the Pajaro River watershed but principally its tributary watersheds. It includes all of the cities of Morgan Hill and Gilroy. It has an area of approximately 360 square miles. The main tributaries of the Pajaro River in the South Zone are the Uvas, Llagas and Pacheco. Creeks tributary to the Llagas are the ones considered in this report, namely, Miller Slough, Little Llagas, Jones Creek and Princevalle Storm Drain. The Miller Slough has its source in the area north and west of Gilroy and has sixteen (16) square miles of drainage area. It flows in a southeasterly direction to a junction with the Llagas Creek near the Pacheco Pass Road. Another important tributary is the Little Llagas which has its source in the area northwest of Morgan Hill. It has 7 square miles of drainage area at the Llagas Creek and flows in a southerly direction to a junction with Llagas Creek at 101 Highway. Another major tributary is Jones Creek, which

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drains water from the easterly side of the valley into the Llagas Creek at Bloomfield Road and drains approximately 9 square miles.

B. Rainfall, Runoff and Flooding

For as many years as the history of Santa Clara County has been recorded, there have been floods or threats of serious flooding from these tributaries.

The mountain range containing the headwaters of the Llagas and Uvas Rivers has the heaviest annual rainfall in the County. It varies from 30 to 75 inches per season, and has frequent storms of from 6 to 9 inches for a 24 hour period, according to a report of the Corps of Engineers published in 1944. Historically, floods have inundated the present downtown section of Gilroy and Morgan Hill with several feet of water and property damage has been extensive.

C. Criteria for Design

The basic design data is based on information derived from local rainfall records and runoff information supplied by the United States Weather Bureau and Geological Survey. Culvert design is based on methods in use by the U. S. Bureau of Public Roads and the State of California.

All open channels and closed conduits are designed using Manning's formula. All channels are designed with a freeboard of two feet.

Because of flat grades existent on the valley floor, few drop structures or other erosion control structures are necessary for the proposed improvements shown on the plans. All culverts will have warped inlets and outlets.

MILLER SLOUGH

A. DRAINAGE AND FLOOD AREA

The Miller Slough, or West Llagas Creek, originates in the moun-

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tains west of San Martin and flows in a southeasterly direction towards the City of Gilroy crossing the main part of town in a southeasterly direction. After leaving the city limits the slough is forced easterly along an old wooden bulkhead that almost completely obstructs the flow; turning southerly the slough crosses the Pacheco Pass Road just west of the Gentry Dehydrated Food Plant and proceeds to a junction with the main Llagas Creek about 200 feet north of the north boundary of the City of Gilroy Sewage Treatment Plant.

The Miller Slough drains about 16 square miles of land. Most of the basin, some 12 square miles, lies west of the Monterey Highway. One fourth of the drainage basin is mountainous while the re= mainder is quite flat. Generally, flooding occurs along the entire reach of the Miller Slough in any period of appreciable rainfall.

Extensive development is in progress in the form of subdivisions, commercial establishments, and conversion of grazing land to strawberries. Many of the commercial establishments are being built in the area opposite to the Be Ge Plant where severe flooding occurred in December, 1955. Changes in land use along the Upper Miller Slough and its tributaries include new subdivisions and strawberry farms.

Most of the flooding north of Gilroy in the storm of December, 1955 occurred in undeveloped areas. This area served as a detention basin and was covered by two to three feet of water. This area is now in the process of development as described above.

B. GENERAL LOCATION OF PROPOSED IMPROVEMENTS

This report covers the proposed improvement of the Miller Slough from Day Road to the Llagas Creek and has been broken down into four separate projects as follows:

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1. Improvement of the upper Miller Slough from Day Road to the northerly city limits of Gilroy, including its three branches -- (a) Day Road Branch, (b) Murphy Lane Branch, and (c) Morey Ave. branch.

2. Improvement of the Miller Slough through the city of Gilroy.

3. Improvement of the lower Miller Slough from the easterly limits of Gilroy, to the Llagas Creek.

4. Construction of a new project to drain the area north and east of Gilroy. The project would begin at 101 Highway just north of the Be Ge plant and extend along the north city limit line turning south on the east city limit line and extending to a junction with the Miller Slough just east of the PG&E Co. substation bridge.

C. DESCRIPTION OF THE PROPOSED PROJECTS

1 (a) UPPER MILLER SLOUGH - DAY ROAD BRANCH

The Upper Miller Slough branches into several channels north of The Gilroy City limits in the vicinity of Wren and Ronan Avenues. The branch of the Upper Miller Slough which has been designated the Day Road Branch originates in the area just west of the Monterey Highway and south of San Martin. It approximately parallels the Highway and in general is about a half mile west of it, first appearing as a definite channel just north of Fitzgerald Avenue. The Day Road branch continues southerly crossing Day Road, Farrell Ave. and Ronan Ave., entering the main Miller Slough between Wren Ave. and Welburn Ave. The project considered here begins at Fitzgerald Ave. with a channel having an 8 ft. bottom and $1\frac{1}{2}$:1 side slopes. At Day Road the corrugated metal pipe culverts will have to be replaced with a bridge and a new trapezoidal channel constructed, having a 10 ft. bottom width, $1\frac{1}{2}$:1 side slopes, and an 8.7 foot depth constructed from Day Road to Miller Slough. New bridges would also be required at Farrel and Ronan Avenues. This channel will follow the present alignment of the existing channel. The land is rather highly developed for farming purposes and right of way costs have been estimated accordingly.

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1 (b) UPPER MILLER SLOUGH - MURPHY LANE BRANCH

The second branch considered for development is termed the Murphy Lane Branch for the purposes of this report. This branch roughly parallels the foothills about a half mile distant therefrom, and carries most of the runoff from the westerly hills beginning at Highland Avenue and extending southerly to Day Road. It first appears in a definite channel in the nature of deep drainage gutters along both sides of Murphy Lane, branching into a definite channel just north of the intersection of Murphy Lane and Day Road; this channel crosses Day Road about 200 feet west of Murphy Lane and crosses the Day Road twice again before running southeasterly to a junction with the main slough just east of Wren Ave., crossing Kern, Tatum and Wren Avenue en route. It is proposed to realign a major portion of this channel beginning at the crossing of the Day Road just west of Murphy Lane. A new channel having a 6 foot bottom width, 1½:1 side slopes and 8.0 foot depth including two feet of freeboard would be constructed southerly and parallel to Morey Avenue and the new channel is then extended to the junction with the Morey Avenue branch. New bridges will be required at Morey, Kern and Tatum Avenues.

1 (c) UPPER MILLER SLOUGH - MOREY AVENUE BRANCH

The third branch considered for development has been termed the Morey Avenue Branch for the purposes of this report. There are actually two branches of the Miller Slough that extend from Wren Ave. westerly to Morey Avenue. The southerly of these two branches has not been considered in this report. The northerly of the two branches is the one considered in this report and carries the major portion of the drainage west of Morey Ave. and south of the Day Road. The major runoff in this channel comes out of the canyon entered by

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Day Road west of Morey Ave. It is proposed to improve this channel commencing with a new bridge at Morey Avenue and a new channel having a 10 foot bottom width, 1½:1 side slopes and a 7.7 foot depth including 2 feet of freeboard. This channel will continue more or lessalong the present alignment to Kern Avenue. A new bridge will be required at Kern Avenue, Then the channel will be continued to the junction with the Murphy Avenue branch. At the junction the bottom width will be increased to 15 feet and the channel will be continued along Wren Avenue to a junction with the south branch where the bottom is widened to 25 feet. This channel is then continued along the present alignment through a junction with Day Road branch to Welburn Ave. A new bridge will also be required at Wren Avenue.

2. MILLER SLOUGH - GILROY SECTION

The improvement of the existing Miller Slough through the city of Gilroy is proposed tobegin at the centerline of Welburn Avenue and to proceed southeasterly through the city to the bridge over the slough at the PG&E Company substation. Existing bridges are very close to being adequate and with some foundation work and other improvements will be adequate.

Where the channel passes under the lumber sheds of the Builders Supply Co. some major work will be necessary and concrete lining may be required. The bridge at I.O.O.F. Avenue is adequate. The bridge at Forest Street is also adequate in waterway opening, but is a hydraulic nightmare since the bridge was built on a considerable skew to accomodate the old channel and the skew is reversed from the present alignment. It is advisable to construct a new bridge at Forest Street though satisfactory results can probably be obtained with the

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present bridge. The bridge at Lewis St. consists of two corrugate multiplate pipe arches and one pipe arch, which at present are inadequate but may be improved. It is recommended that this bridge be replaced with an adequate clear span bridge adapted to the new channel. The bridge at Sixth Street has adequate waterway opening, but will require underpinning of the foundations. The bridge over the slough to the PG&E substation will require replacement. The recommended improvements to the channel are as follows: From the centerline of Welburn Avenue to the PG&E Company substation bridge; construct a trapezoidal channel of 20 foot bottom width, 1½:1 side slopes, and 11.7 foot depth including 2 feet of freeboard.

3. LOWER MILLER SLOUGH

The improvement to the Lower Miller Slough is proposed to begin at the PG&E Co. bridge over the slough and run southeasterly to the Llagas Creek. From the PG&E bridge the channel will follow a portion of the present alignment until the wooden bulkhead mentioned above is reached. This bulkhead is along the line common to Lots 4 and 5 of the "Elizabeth H. Martin Tract". From this point to the lot line between lots 5 and 6 the channel will be realigned to follow the original channel route. This will be a trapezoidal channel having a 20 foot bottom width, 1½:1 side slopes, and an 11.6 foot depth including 2 feet of freeboard to the confluence with the Princevalle Storm Drain. From the Princevalle storm drain outfall to the Llagas Creek the channel will have a 30 foot bottom and a depth of 11.6 ft. including freeboard. No major structures are required for this project. The bridge on the Pacheco Pass Road, a State Highway, has adequate flow area, but may need underpinning of the foundations.

4. EASTERN MILLER SLOUGH

Should the Miller Slough be improved as recommended, a channel

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to be known as the Eastern Miller Slough should be constructed to divert the water north of the High School Grounds and provide drainage for the future development of the area northeast of theCity of Gilroy. This project would consist of a 42" reinforced concrete pipe extending east from a point on Monterey Highway just north of the Be Ge plant along the north corporate limit line to the eastern corporate limit line. A 60" reinforced concrete pipe would extend southerly along the corporate limit line to Leavesley Road and continue east along the southern edge of Leavesley Road to a point approximately midway between Forest St. and Murray Avenue. At that point a trapezoidal channel having a 3 foot bottom width, 1½:1 side slopes and a minimum required depth of 7.1 feet including 2 feet of freeboard would then commence in a southerly direction to a junction with the Miller Slough just east of the PG&E bridge. The actual depth of this channel would be greater than the required minimum for most of its length because of the depth required for the 60" reinforced concrete pipe. There are two existing 30" culverts under Forest Street that carry water west, through the high school grounds, entering Miller Slough approximately 650 feet southerly of the railroad bridge. It is suggested that these existing 30" culverts be used as overflow structures furthering the drainage flood protection for Gilroy High School and any future local development. A new culvert would be required at Murray Ave. and at Gilman Road.

D. SUMMARY

In the consideration of any improvements to the channels of the Miller Slough from San Martin to the Llagas Creek it is important to keep in mind that the Miller Slough and its tributary branches are the main drainage channels for a major portion of the southern Santa

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Clara Valley. In the present condition some severe flooding has occurred during major storms. The flooding is getting progressively worse as the nature of the land uses change. Any substantial development in the area west of 101 Highway and south of San Martin will create possibilities of major disaster without improvement of the Miller Slough. It is of primary importance that the right of way for the various channels be acquired and protected before any further obliteration or obstruction occurs. If funds for construction are limited and the projects must be done by stages, it is recommended that the following priorities be followed:

1. Improvement of Lower Miller Slough.
2. Improvement of Miller Slough through city of Gilroy.
3. Improvement of East Branch of Upper Miller Slough.
4. Improvement of the Morey Avenue branch of Upper Miller Slough.

The estimated cost of improving Miller Slough as outlined above is $1,200,000.00.

JONES CREEK

A. DRAINAGE AND FLOOD AREA

Jones Creek originates in the eastern foothills of the Santa Clara Valley about 4 miles northeast of the city of Gilroy and flows out of the Canyon followed by Leavesley Road.

Jones Creek drains about 5600 acres of land consisting of 2700 acres of steep grass and brush-covered hillside with a scattering of oak timber and 2900 acres of gently sloping land of generally good quality under intensive farming operations.

Flooding occurs along the entire course of Jones Creek after it crosses Leavesley Road. The nature of the terrain is such that in most storms the water is more or less absorbed in the flat farming areas, but during storms of heavy or long duration the saturation point is reached and a heavy sheet runoff occurs. There is very

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10. From the end of Section 9 to a junction with Jones Creek, construct a new trapezoidal channel having a 3 foot bottom width, 1½:1 side slopes, and a depth of 5.4 feet including freeboard.

D. SUMMARY

The work recommended above should relieve the present flooding conditions along Jones Creek. No work has been recommended on the channel between Leavesley Road and the beginning of the recommended work on the main channel. This channel has been cleaned and improved through cooperation between the property owners, the Soil Conservation Service, and the District. A similar arrangement is being presently worked on for the channel from Leavesley Road to the Llagas Creek.

It is also cautioned that the recommendations made above are made on the basis that improvement work will be done in the Llagas Creek Channel from Leavesley Road south to the city of Gilroy Sewer Farm. There is a critical levee condition along the west bank of the Llagas Creek and serious damage west of the Creek can occur if the water from the diversion of Jones Creek contributes to the topping of the levee along the Llagas Creek. The diversion should only be considered on the basis of some channel improvement in the Llagas Creek proper.

Although some work has and is being done by the Soil Conservation District, the property owners and the District, it is felt that as development proceeds some additional work is necessary to bring the channel up to the capacity outlined in this report.

The total estimated cost of the projects outlined above is $200,000.00

THE PRINCEVALLE STORM DRAIN

A. DRAINAGE AREA

The purpose of the project is to provide drainage for the tri-

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lent:

1. Construct a diversion channel along the southerly side of Leavesley Road from the present crossing of Jones Creek, westerly to the Llagas Creek.

2. After the diversion recommended above is constructed, it is then considered unnecessary to do any major work on the present channel of Jones Creek until the vicinity of the Pacheco Pass Road is reached. As the second part of the work on Jones Creek, it is then recommended that the present channel be improved commencing at a point about 1000 feet northerly of the Pacheco Pass Road and continuing more or less along the present alignment to the Llagas Creek.

3. Construction of a new channel to relieve flooding along Bloomfield Ave. between the Pacheco Pass Road and Frazer Lake Road. This channel would commence on the westerly side of the Pacheco Pass Road at a point midway between Bloomfield Ave. and Prunedale Ave. and extend westerly and parallel with Bloomfield Ave. until a junction with Jones Creek is reached.

4. From a point 1000 feet north of the Pacheco Pass Highway to the Pacheco Pass Highway, construct a trapezoidal channel with 8 foot bottom width, $1\frac{1}{2}$:1 side slopes and 5.1 foot depth including freeboard.

5. From Pacheco Pass Highway to a point 1540 feet downstream, construct a trapezoidal channel having an 8 foot bottom width, $1\frac{1}{2}$:1 side slopes and a 7.3 foot depth including freeboard.

6. From the end of Section 5 to junction with branch from the East, construct a trapezoidal channel with 8 foot bottom width, $1\frac{1}{2}$:1 side slopes and a 6.6 foot depth including freeboard.

7. From the end of Section 6 to the junction with Prunedale Ave. branch, construct a trapezoidal channel having a bottom width of 10 feet, side slopes of $1\frac{1}{2}$:1, and a depth, including freeboard, of 8.9 feet.

8. From Prunedale Ave. branch to Frazer Lake Road, construct a trapezoidal channel with a 10 foot bottom width, $1\frac{1}{2}$:1 side slopes, and a 9.6 foot depth, including freeboard. Construct bridge at Frazer Lake Road.

9. Install new 36" C.M.P. at Pacheco Pass Highway about 1500 feet north of Bloomfield Avenue. From this culvert construct a new trapezoidal channel having a 3 foot bottom width, $1\frac{1}{2}$:1 side slopes and a 4.8 foot depth including freeboard to a point 2314 feet west of Pacheco Pass Highway.

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little possibility of the general use of the land changing in the foreseeable future.

B. GENERAL LOCATION

Jones Creek crosses Leavesley Road just easterly of New Avenue and flows southerly crossing Dunlap Road just westerly of Furlong Avenue; crosses Furlong Avenue just southerly of Dunlap Road; crosses Pacheco Pass Highway just easterly of Furlong Avenue and continues in a southwesterly direction down back property lines to a point near the junction of Bloomfield Avenue and Frazer Lake Road. From this point it continues westerly along the northerly side of Bloomfield Avenue and joins the Llagas Creek through a box culvert under Bloomfield Avenue

in conjunction with the bridge over the Llagas Creek. Jones Creek is joined by drainage from poorly defined channels at Dunlap Road, near the Pacheco Pass Road, at the Pacheco Pass Road, and in at least three points between Pacheco Pass Road and Frazer Lake Road.

C. DESCRIPTION OF THE PROJECT

It is well to point out that it is impossible to provide an adequate outlet for Jones Creek as the end of the present channel is in the historic flood plain of the so-called Frazer Lake. During the storm of December, 1955 the water in this lake was standing with a static level that flooded the intersection of Bloomfield Avenue and Frazer Lake Road. It is therefore apparent that any project on Jones Creek can only lead the flood waters to the Frazer Lake. There is an extensive area at the lake that has always flooded approximately 2000 to 4000 acres during a storm comparable to December, 1955. The following projects are recommended to correct the flooding now preva-

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angular area of 1200 acres in the Gilroy area. The area is limited on the north by the two cemeteries just west of Gilroy on the Hecker Pass Road; on the southwest by the levees along the Carnadero Creek; and on the east by Princevalle Street in the City of Gilroy. During the storm of December, 1955, severe flooding occurred along the course of this proposed project. Monterey Highway was blocked by the flood waters at the crossing of this channel.

The area was drained in the past by several natural swales or channels which ran southwesterly through the City of Gilroy and by one major channel that ran just southerly of the City and crossed the Southern Pacific Railroad tracks about a half mile south of the City. From this point the channel worked its way southeasterly until it emptied into the former Frazer Lake, which still exists in times of severe floods. This lake was formerly in existence the year round and was covered by a dense growth of willows and tules. This lake area has been gradually cleared and is now used for productive agricultural purposes. The Llagas Creek has been extended through the former lake bottom by a man made channel with high banks' built up above the natural ground. The channel draining southeasterly from the City of Gilroy has been completely obliterated east of theSouthern Pacific Railroad. A large pile trestle is still in existence on the railroad in a good state of repair.

The area to be served is beautifully situated with an excellent view of the mountains which lie to the southwest of the Carnadero Creek. This is the area for natural expansion of the City of Gilroy for residential purposes.

B. GENERAL LOCATION

The natural channels which originally drained the area have been destroyed or obliterated by development. The location of the

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proposed channel is shown on the plans.

C. DESCRIPTION OF THE PROJECT

The only practical solution to the control of flood waters in this area would require underground conduit from the intersection of Fourth and Princevalle Streets southerly along Princevalle St. to be constructed following existing property lines, crossing Monterey Highway and the Southern Pacific Railroad at the location of the old channel and the present structures. From this point the channel would follow property lines, when possible, easterly to a junction with the Miller Slough about 2160 feet south of the Pacheco Pass Road. The channel will consist of a trapezoidal section with a 3 foot bottom width, a minimum depth of 6½ ft. and 1½:1 side slopes

D. SUMMARY

An analysis of the history of drainage problems in the area under consideration in this report reveals that the City of Gilroy is free from the threat of damage-producing floods up to the point where the Carnadero Creek overflows and tops the levee along the easterly bank.

The project recommended above will serve adequately for removing surplus waters other than topping of the levee. It is recommended that further study be made of the construction of both water conservation and flood control dams on the Uvas, Little Arthur and Bodfish Creeks as the City of Gilroy will have no real protection from flood damage until the threat of possible topping of the Carnadero Creek levee is removed.

The estimated cost of this project is $231,000.00.

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LITTLE LLAGAS CREEK

A. DRAINAGE AND FLOOD AREA

The Little Llagas originates in the mountains northwest of Morgan Hill and flows through the town in a southerly direction. South of town it flows nearly parallel to the Monterey Highway and crosses it just south of the Watsonville Road. The stream west of the Monterey Highway drains 1900 acres of mountainous land and 2500 acres of land ranging from moderately sloping to flat.

Severe flooding occurs in the areas north of Llagas Avenue, adjacent to Fifth Street, north of the Watsonville Road, and East of the Southern Pacific Railroad in the vicinity of Central Avenue. Moderate flooding occurs between Warren and Del Monte Streets and along the Monterey Highway at Fourth St.

The town is protected from extreme flooding by the following factors:

(1) Llagas Avenue acts as a dam. The culvert at this crossing is totally inadequate.

(2) The area East of the Southern Pacific Railroad, near Central Avenue, has virtually no outlet and the area becomes a lake during a storm.

(3) The area west of town is still virtually undeveloped. Because these conditions exist at the present time the town has been relatively safe.

It is likely that ranchers north of Llagas Avenue will seek to eliminate flooding in that area. Developers, both residential and industrial, will seek to improve lands which are serving now as storage areas. Should either of these conditions result, Morgan Hill would be vulnerable to severe flooding.

B. GENERAL LOCATION

The project embraces the area bounded by the drainage divide just north of Morgan Hill, the mountain ridges on the West, Monterey

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Road on the East, and the Llagas on the south and west to Rucker Ave.

C. DESCRIPTION OF THE PROJECT

At Llagas Avenue the existing 36" culvert has a capacity of 60 cfs with a two foot head. The runoff caused by the 15-year flood will be about 325 cfs. The inadequacy of this culvert results in the formation of a lake north of Llagas Avenue with some runoff forced north thereby contributing to the very poor drainage conditions west of the railroad between Madrone and Coyote.

South of Llagas Avenue the channel to and culvert under Wright Ave. are inadequate. South of Wright Avenue the channel has been improved. During the storm of December 23, 1955 water rose to the tops of the banks between Wright and Main Avenues. The estimated flow in this reach was about 300 cfs. Water was ponded west of the channel by a levee averaging 1.5 feet in height. Further, about 800 acres east of the Southern Pacific Railroad should normally drain via Central Avenue to the Little Llagas midway between Wright and Main Avenues. This drainage is blocked by the railroad and consequently the area was completely flooded.

It is quite possible that these areas which are close into Morgan Hill would be converted to subdivisions because of the desirable location and topography. These changes would increase the runoff.

The 5x8 culverts at Main, Warren, Second, along the Monterey Highway, at Fifth, Dunne, Spring Avenues and the roads to the South are all inadequate.

The following points summarize these existing conditions:

(1) North of Wright Avenue -- general flooding in this area because of inadequate culverts under and channel between Llagas and Wright Avenues.

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(2) Wright Avenue to the Monterey Highway -- channel and structures are barely adequate to pass the 15 year storm providing no additional flow is added from those areas which now act as reservoirs.

(3) Monterey Highway south -- the culvert and channel are inadequate and flooding has occurred at Fifth, Dunne and the Watsonville Road.

The recommended improvements are shown on the plans and described as follows; (All channel depths include a minimum of 2 feet of freeboard.

(1) Llagas Avenue to Wright Avenue

A trapezoidal channel of 6 feet bottom width with $1\frac{1}{2}:1$ side slopes and 6.2 foot depth.

(2) Wright Ave. to Main Avenue.

A trapezoidal channel of 8 feet bottom width with $1\frac{1}{2}:1$ side slopes and 8.3 foot depth.

(3) Main Avenue to Third St.

A trapezoidal channel of 8 feet bottom width with $1\frac{1}{2}:1$ side slopes and 8.5 feet depth.

(4) Third St. to Dunne Avenue

Retain present alignment with a lined channel of 6 ft. bottom width and 1:1 side slopes. Enlarge existing box culvert at Monterey Highway to 8x10. Maximum backwater depth will be 8.3 feet in the lined channel. Depth of lined channel will be 10.3 feet at the Highway and 9 feet at Third St.

(5) Dunne Avenue to Spring Avenue

A trapezoidal channel of 8 foot bottom width with $1\frac{1}{2}:1$ side slopes and 9.0 feet depth.

(6) Spring Avenue to 460 ft. south of Edmundson Avenue.

A trapezoidal channel of 8 foot bottom width with $1\frac{1}{2}:1$ side slopes and 9 feet depth.

(7) End of Section (7) to 630 feet north of Watsonville Road.

A trapezoidal channel of 10 foot bottom width with $1\frac{1}{2}:1$ side slopes and 11 foot depth.

(8) From end of Section (8) to Middle Avenue.

A trapezoidal channel of 14 foot bottom width with $1\frac{1}{2}:1$ side slopes and 10 foot depth parallel to and west of

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Monterey Highway.

(9) Middle Avenue to Llagas Creek

A trapezoidal channel of 20 foot bottom width with $1\frac{1}{2}$:1 side slopes and 10.5 foot depth.

(10) Channel improvement east of Monterey Highway to insure positive grade and proper alignment of the channel to accomodate local drainage after completion of the diversion project.

(11) The construction of a culvert at Llagas Avenue and the bridges at Wright, Main, Warren, Del Monte, Third, Fifth, Dunne, Spring, Edmundson and west Middle Ave. and the Watsonville Road.

D. SUMMARY

The drainage facility provided by Little Llagas Creek is the only outfall for storm drain in the Morgan Hill area between the S. P. crossing over 101 Highway and the Llagas Creek, and between the east and west hills. As far as the present capacity of the Little Llagas is concerned, the creek is non-existent.

Proposed land development in this area will be subject to flooding if recommended improvements are not constructed. It is extremely important that the necessary rights of way be acquired and construction started at the earliest possible date.

The estimated cost of improving the Little Llagas Creek as outlined above is $780,000.00.

MAINTENANCE

Proper maintenance of all flood control facilities is of vital importance to any flood protection program. In addition to the silting problem explained in previous portions of this report, streams become clogged by natural growth within the channels, and the deposits of rubbish within the channels by those who do not have the proper consideration of the property rights of others, or cost of channel maintenance. Such foreign substances are commonly known

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to all. They consist of lawn clippings, garbage, unwanted wood, unwanted bed springs, washing machines or any other forms of refuse that people will throw into a creek bed rather than transport it to a public dump.

In order to prevent such unauthorized action, the Board of Supervisors of the Santa Clara County Flood Control and Water Conservation District has adopted Ordinance No. 59-1 which makes it illegal to throw any refuse of any type or nature into a District constructed or natural channel. Violators are subject to a fine or imprisonment. By the terms of such ordinance, those private persons owning creeks that run through them are required to reasonably maintain them so that such creeks will not retard the flow of water. It is anticipated, however, that as the years go by the Santa Clara County Flood Control & Water Conservation District will acquire property rights in all such natural watercourses and when such rights are acquired the Santa Clara County Flood Control & Water Conservation District, being the owner of such stream channels, will maintain them. In addition to enforcing the above-mentioned ordinance, channel maintenance is accomplished in one of the following ways:

(a) Silt removal.
(b) Snagging and clearing of tree and shrubbery growth within the channels.
(c) Clearance of debris.
(e) Erosion control to prevent silting.

Where the natural streams have adequate capacity and do not need construction projects, it is proposed that erosion be controlled by one or more of the following methods; sack revetment, deposit of heavy materials along the bank sides of the channels, planting of protective grasses, or if necessary, the installation of drop struc-

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tures. Natural growth would be controlled either by mechanical or manual removal as it occurs, or, where possible, the prevention of such growth would be accomplished by the use of chemicals or other weedicides. In the case of chemicals or weedicides, they will be used only after consultation with the County Agricultural Department so as to insure that no harm will come to adjoining properties. Silt removal will, of course, necessitate the periodic use of heavy equipment for removing or excavating the silt as the need occurs.

BENEFITS RESULTING FROM THE PROGRAM

The improvements proposed in the enclosed report would be of benefit to Zone S-1 in the following manner:

1. Public property including city and county roads, public school property, state highways, Federally owned property and other publicly owned installations would benefit greatly from reduced flood hazards and danger of inundation such as experienced in 1955 and 1958.

2. Privately owned property would receive the same benefits.

3. Development of presently undeveloped areas would no longer be curtailed. The proposed channels have been designed to carry increased runoff from the areas in which complete urbanization is anticipated, in addition to the runoff from undeveloped areas during flood periods.

4. Economic benefits will result in the entire zone. By reducing or eliminating the threat of flood to lands presently subject to such hazards, the land becomes available for higher uses and the land value automatically increases. Present trends indicate that Santa Clara Valley will become one of the nation's great centers for

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residential, commercial and industrial activity which will in turn maintain employment and business activity resulting in a sound economy. The failure to provide adequate flood control will retard such orderly development.

FINANCING OF THE PROGRAM

The total cost of construction works proposed in this report is estimated to be the sum of $2,411,000.00, including all such costs as right-of-way acquisitions, engineering, legal, administrative and other incidental expenses. Improvement of the reaches of these creeks as shown on the accompanying plans must be accomplished in its entirety within as short a time as possible.

As previously explained, an application for Federal financial assistance has been made under Public Law 566. This law is administered by the Secretary of Agriculture of the Federal government. Under the provisions of this law, the Federal government will provide all construction costs for watershed protection if the cost of the work amortized over a fifty year period does not exceed the estimated annual damages over the same fifty years. On those projects which meet the cost-benefit ratio, the State of California will provide reimbursement to the local agencies for the costs of lands, rights of way and easements, and utility relocations. From information imparted by the Soil Conservation Division, it would appear that the Miller Slough and Little Llagas Creek will meet the cost-benefit ratio to qualify for Federal aid under P.L. 566; it is questionable as to whether or not Jones Creek will meet said ratio; and the Princevalle Storm Drain, being primarily for the drainage of urban area will not meet the cost-benefit ratio. For these reasons the work on Jones Creek is to some extent being provided by private

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property owners with the understanding that the Santa Clara County Flood Control & Water Conservation District will assume the maintenance of the channels when completed. In order to minimize the financial burden on the taxpayers of the South Zone, it is therefore proposed that no work be performed on the Miller Slough, the Little Llagas Creek, or the balance of Jones Creek until the results of the application under Public Law 566 are determined. Since it has already been determined that the Princevalle Storm Drain cannot be financed with Federal and State funds, it is proposed that available funds of the South Zone be used for its construction.

Most of the available funds in the South Zone have been obtained from the District Revolving Fund. Previous taxes collected in the South Zone have been expended on maintenance and engineering and surveys necessary to complete the accompanying plans. Funds obtained from the District Revolving Fund must be repaid to the Revolving Fund by a levy of taxes within the South Zone. If the funds presently available in the South Zone are not sufficient to cover the construction costs of the Princevalle Storm Drain, then it is recommended that additional funds be advanced by the District to the south Zone to cover such project costs, and that the repayment of such money owed to the District Revolving Fund be raised over a period of approximately ten years. Such a program would result in an annual tax levy of approximately fifteen cents (15¢) per $100 of assessed valuation, which would provide not only the amounts necessary to repay the Revolving Fund, but also to provide minimum maintenance within the Zone and District-wide administration.

In the financing of the Princevalle Storm Drain, fees collected from developers for drainage purposes will be used to repay the zone

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funds expended. The City of Gilroy has committed itself to enter into an agreement whereby the proportionate share of drainage funds collected by the City (i.e., collected from areas which will drain into the Princevalle Storm Drain), will be used to repay the zone funds.

If Federal assistance is not available on Miller Slough, Little Llagas Creek, and the incompleted portions of Jones Creek, then it may become necessary to consider a bonded indebtedness for the South Zone. Prior to such action, it would be necessary to reconsider all phases of the program and hold a public hearing as required by law.

CONCLUSION

This report describes the proposed program to be one which will correct the most pressing flood problems of the South Zone. The existing flooding within the zone is not only a constant menace, but, is entirely unnecessary.

With the information as to the nature of the flood control program for the South Zone made available in this report, all individual citizens and civic-minded organizations should press for Federal financial assistance in this zone and thus share in its continued economic stability as well as the safety of life and property of South Santa Clara County residents.

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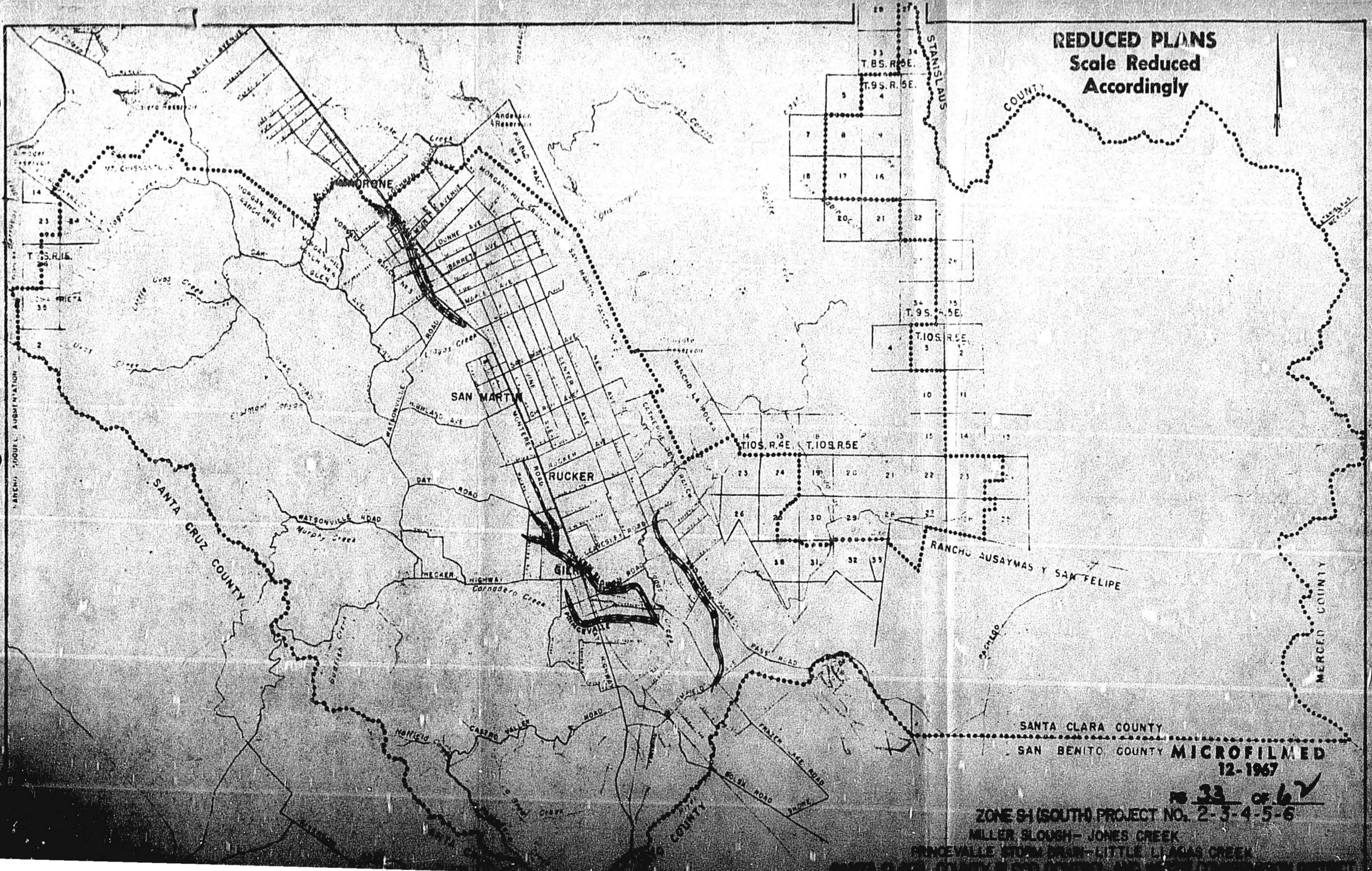

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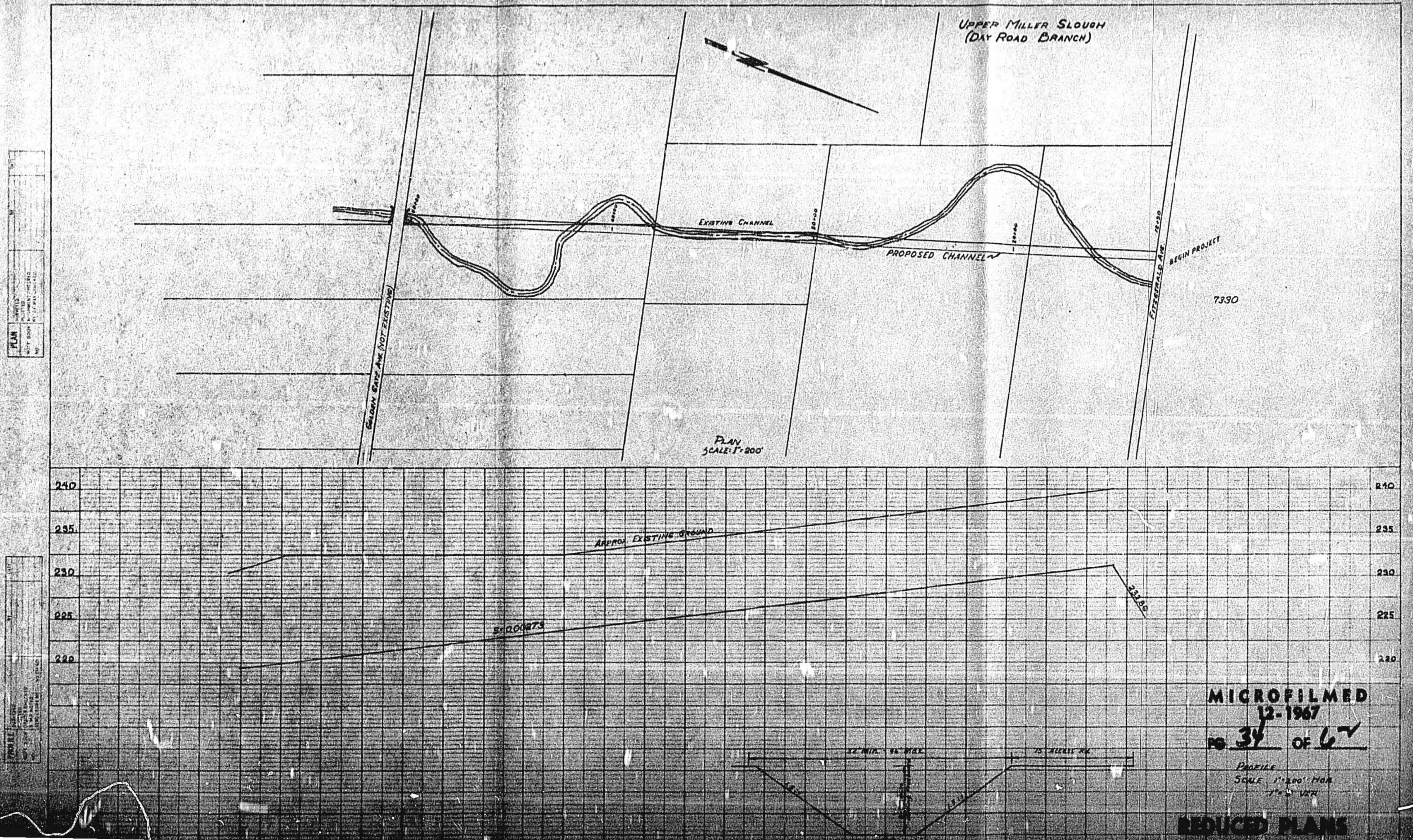
ZONE S-1 (SOUTH) PROJECT NO. 2-3-4-5-6
MILLER SLOUGH- JONES CREEK
PRINCEVALLE STORM DRAIN-LITTLE LLAGAS CREEK
CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



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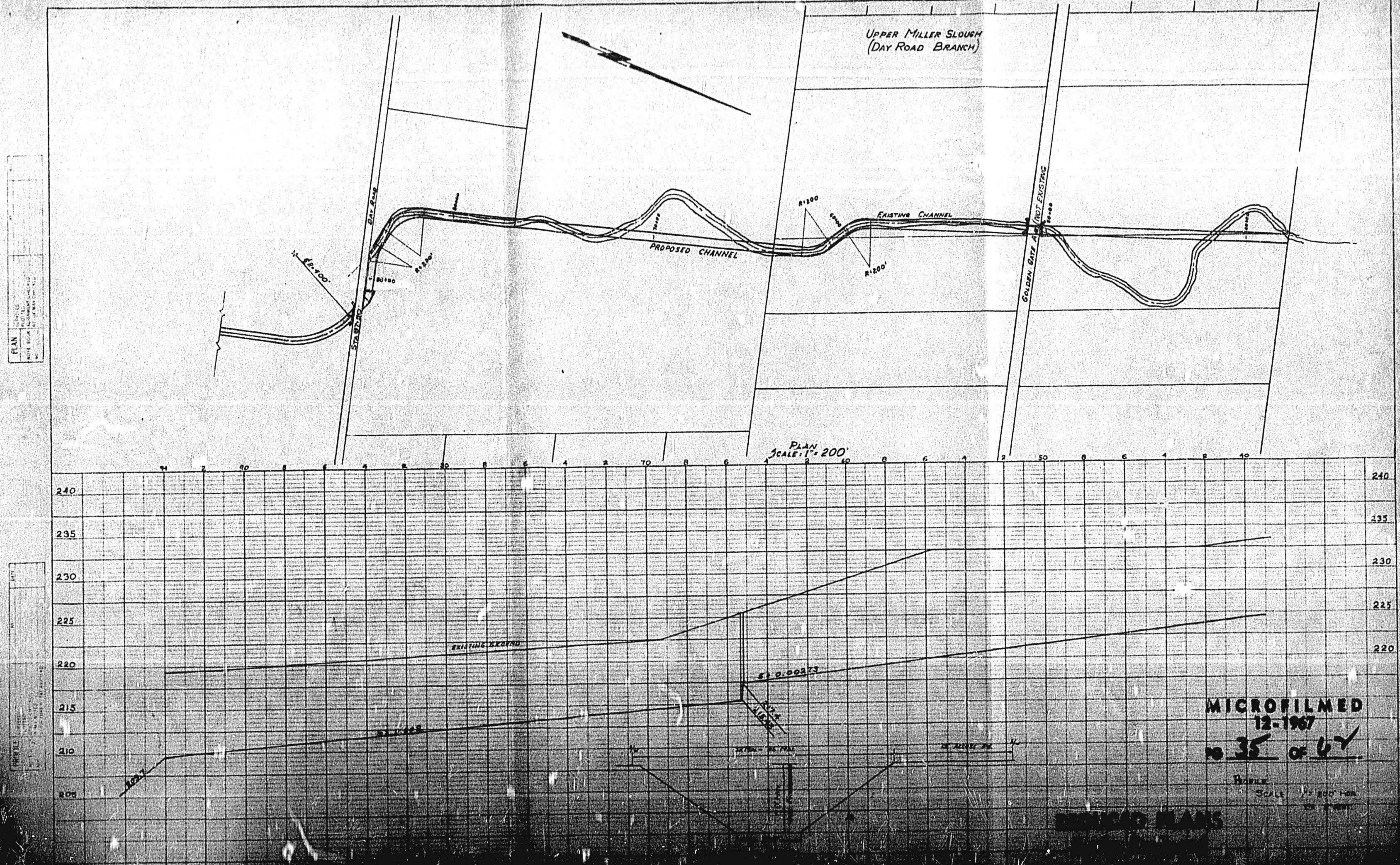

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PROFILE
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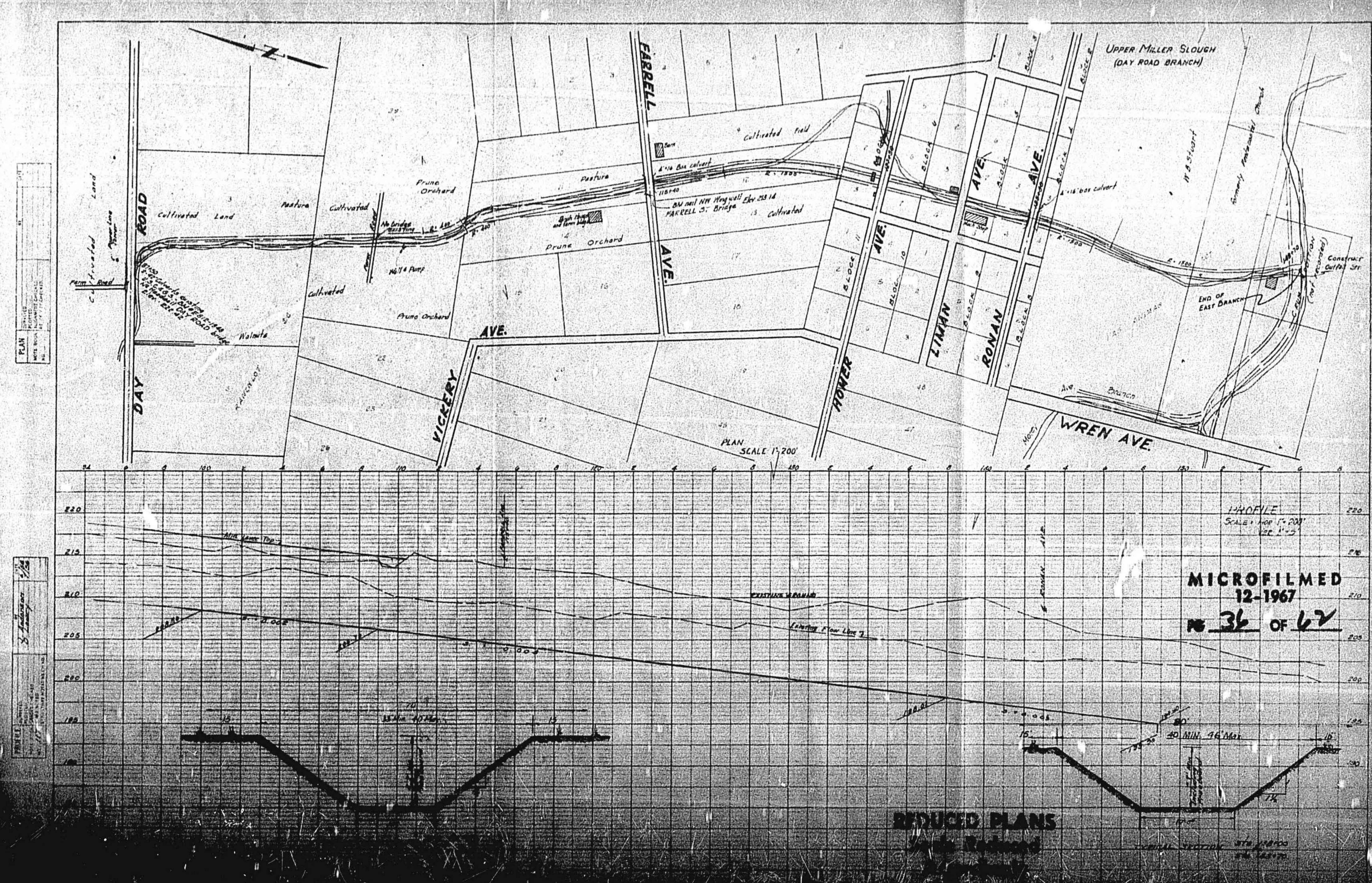

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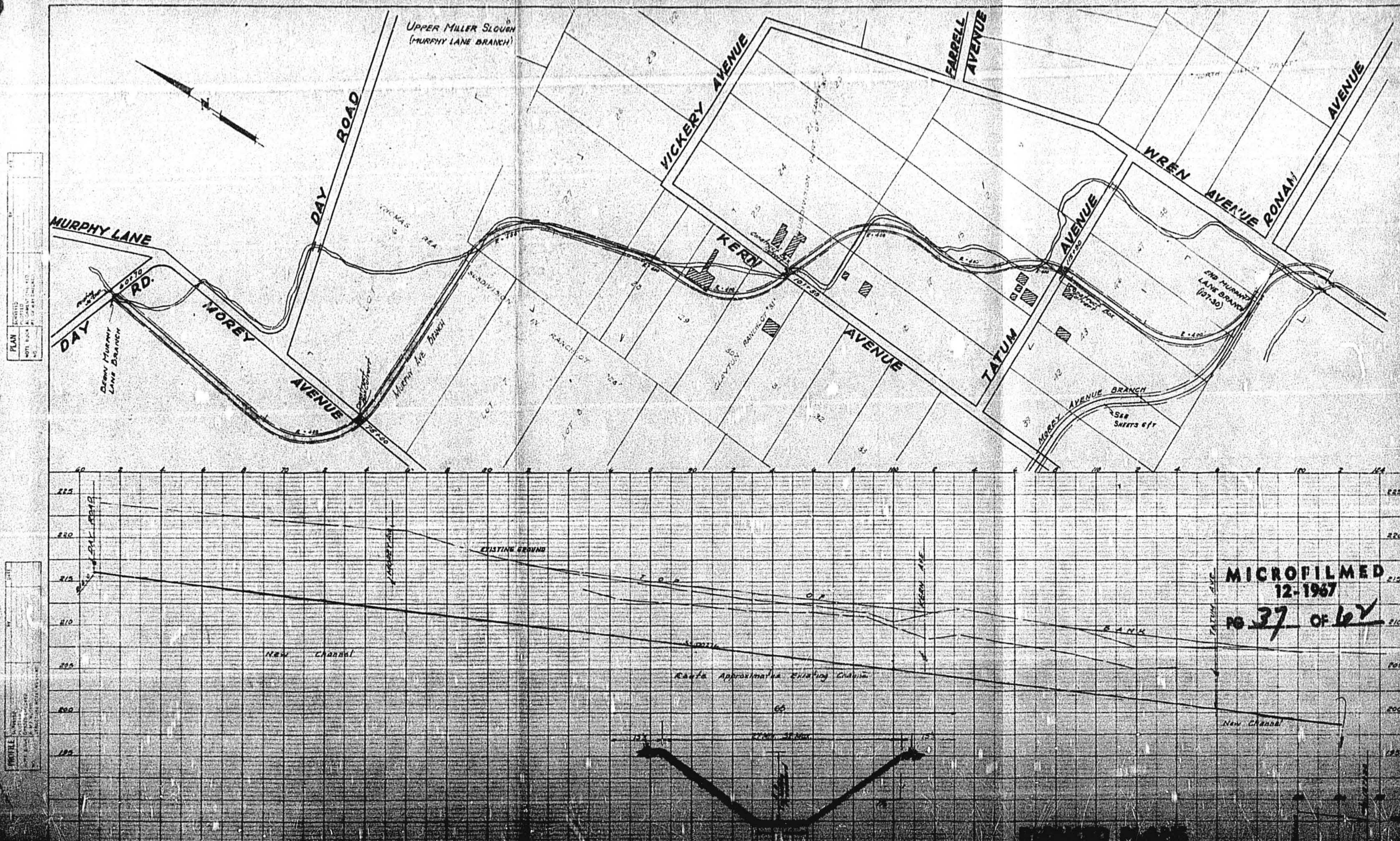

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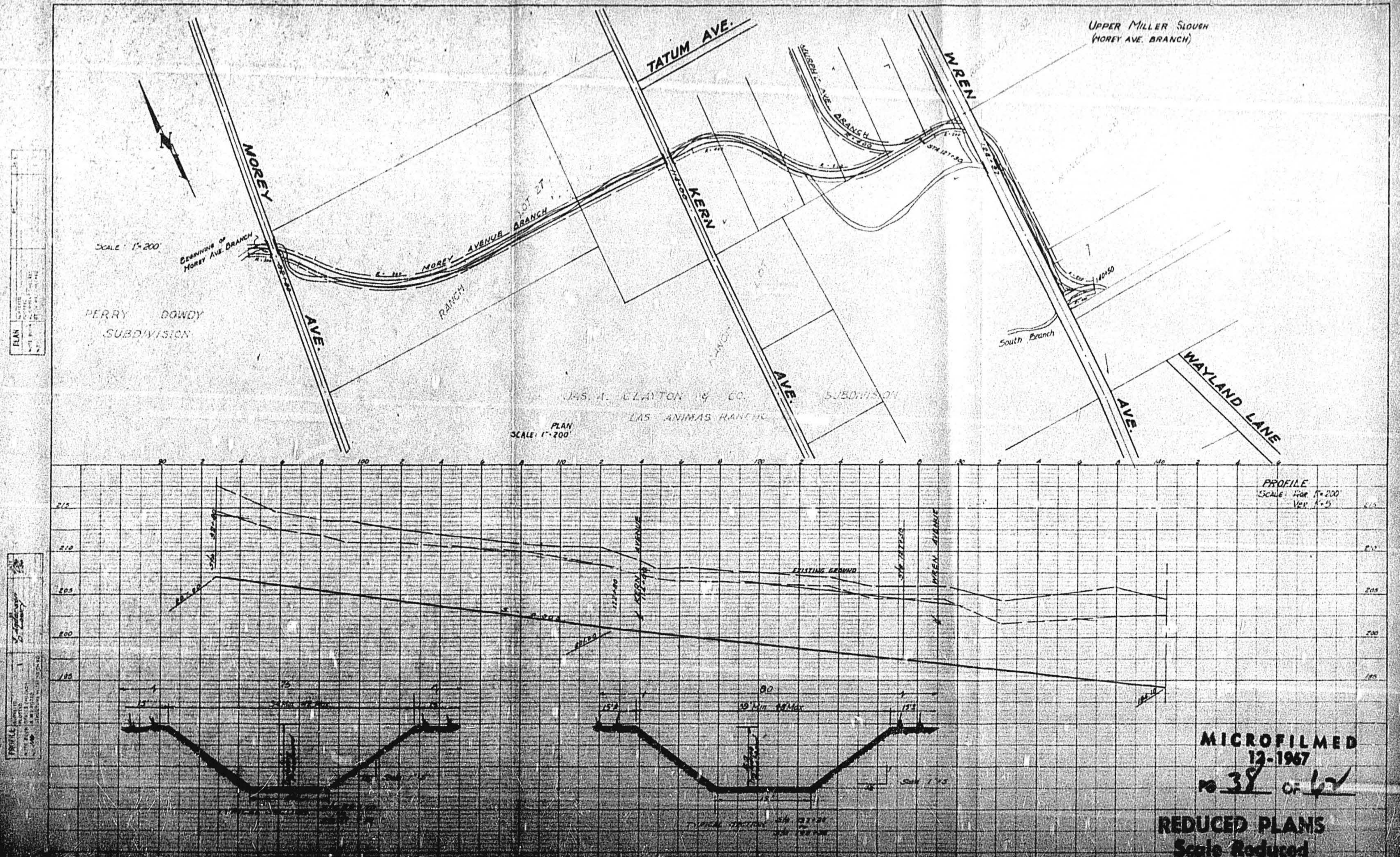

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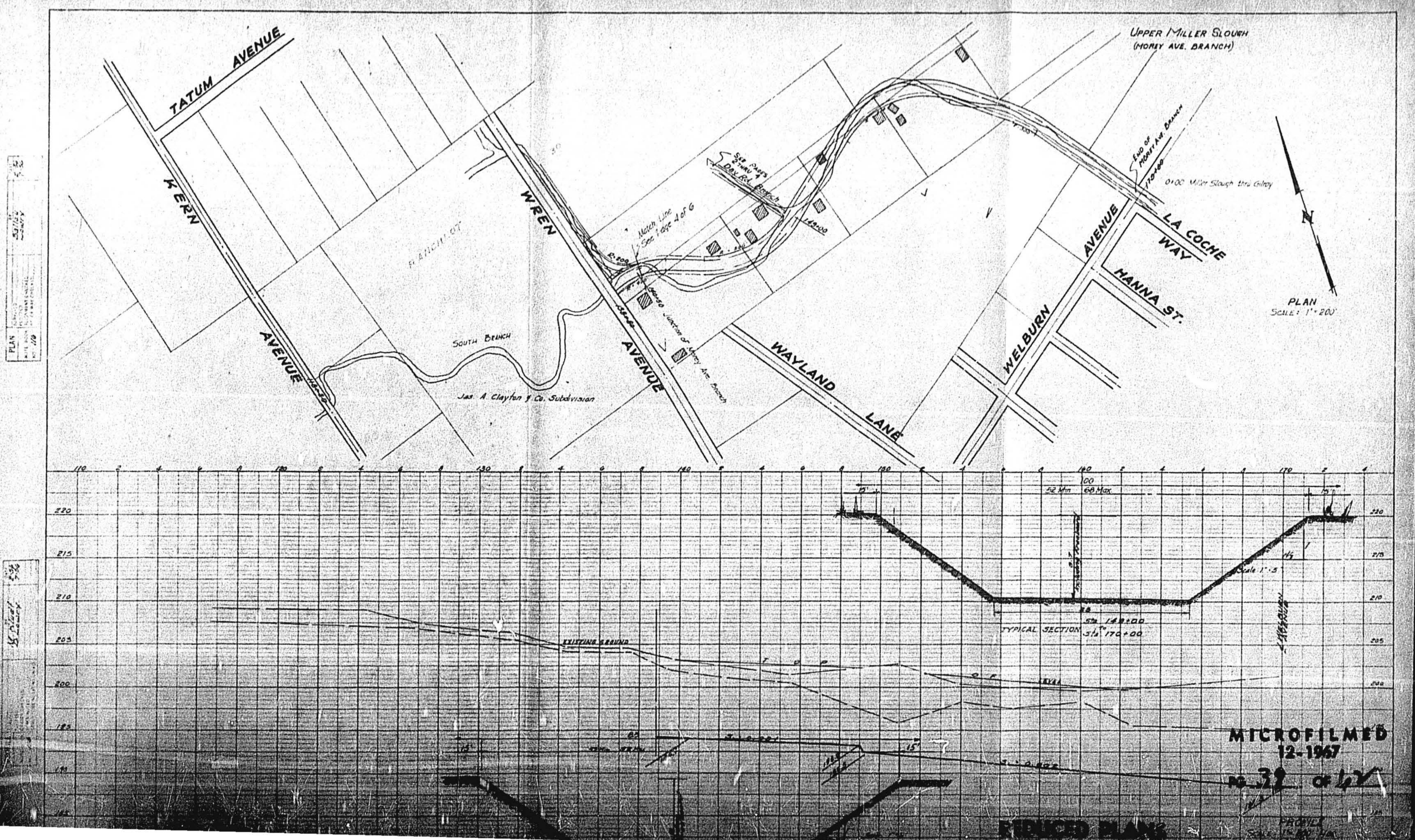

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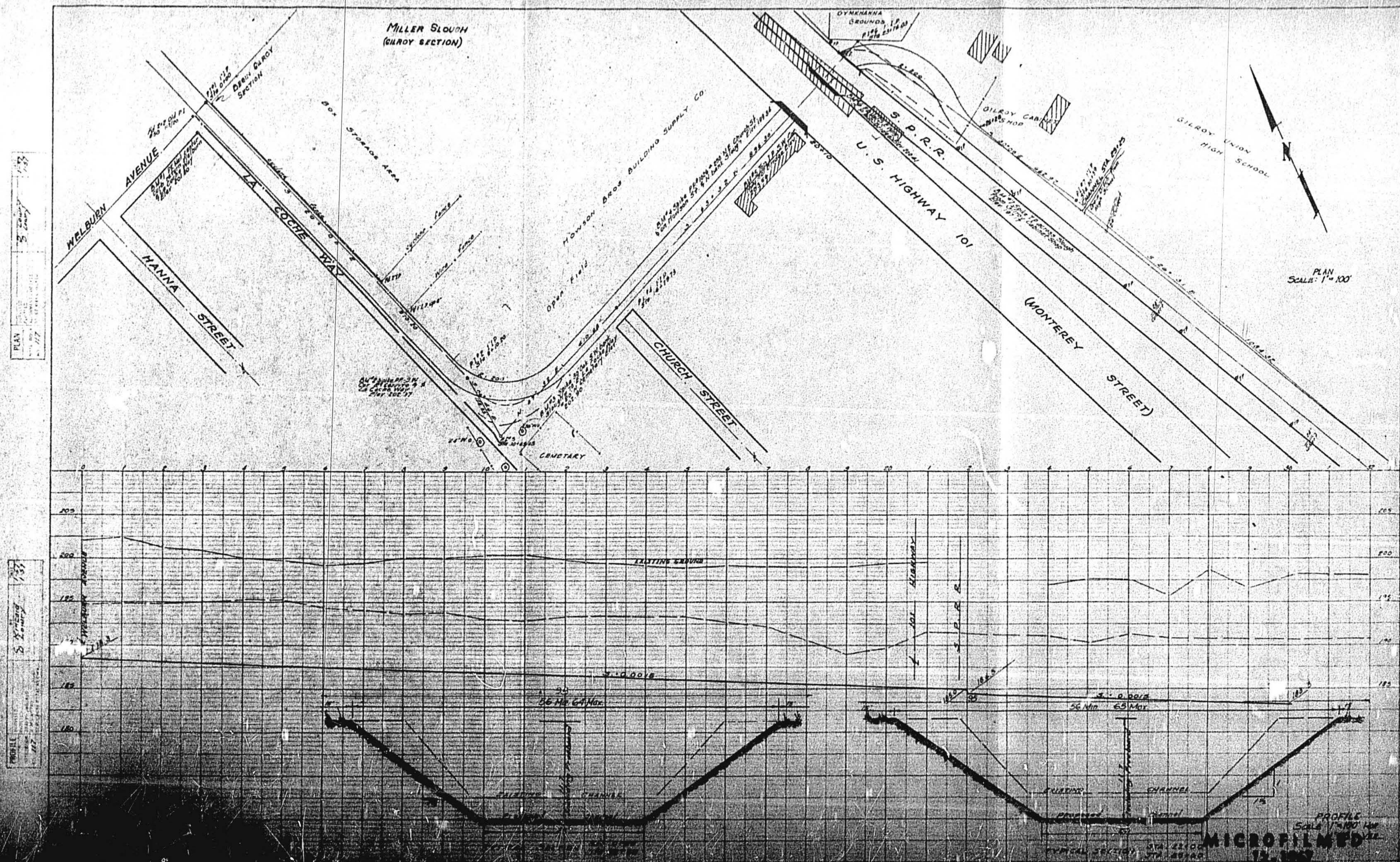

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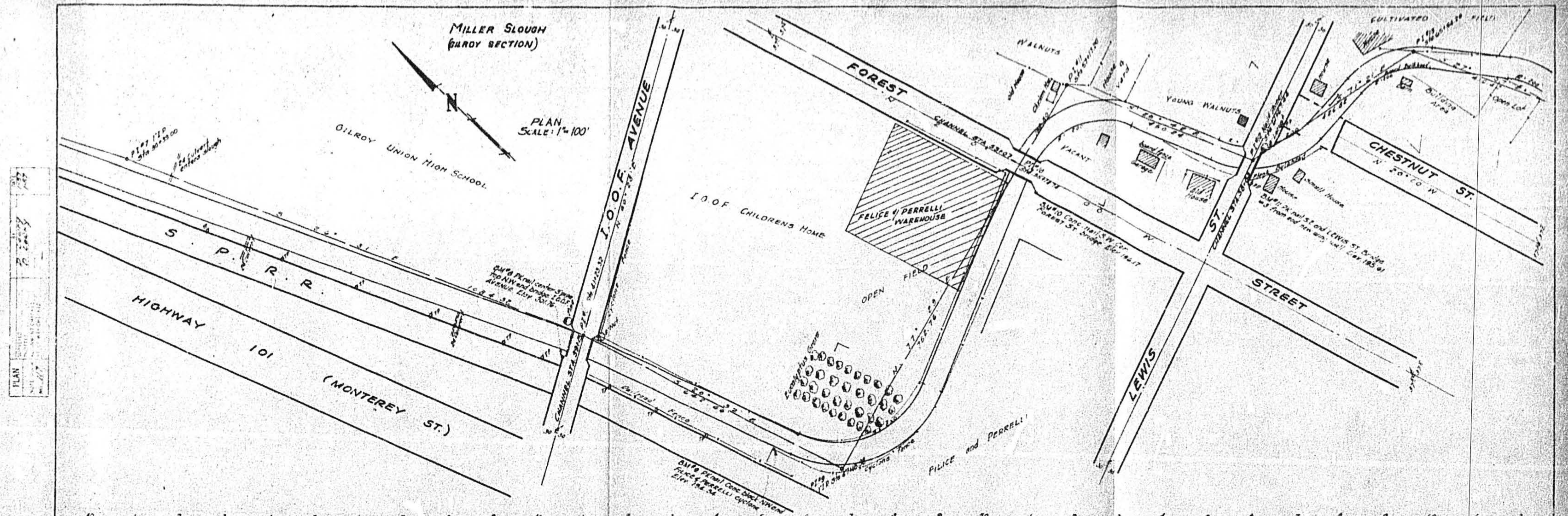

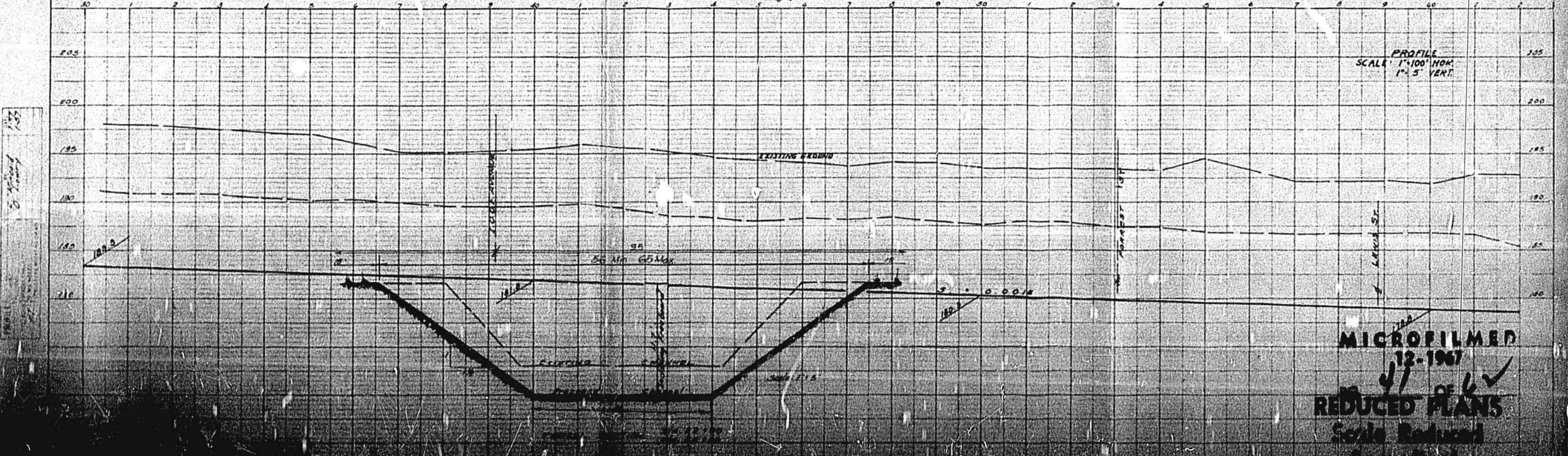

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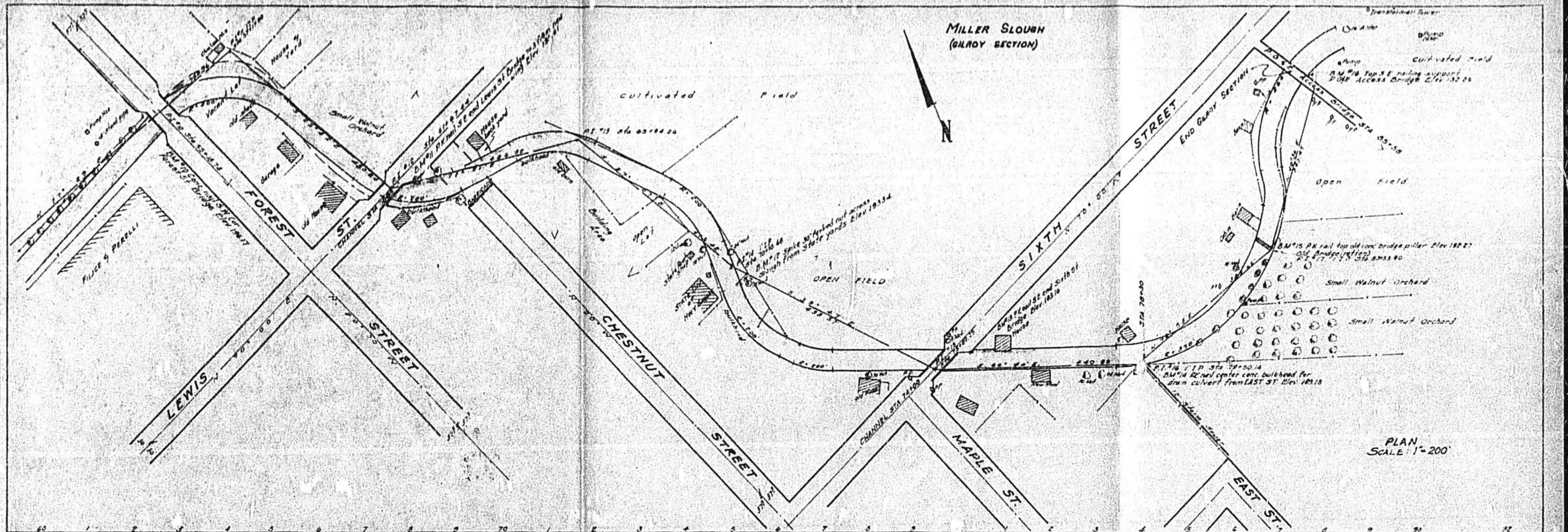
PROFILE NOTE BOOK NO. 117



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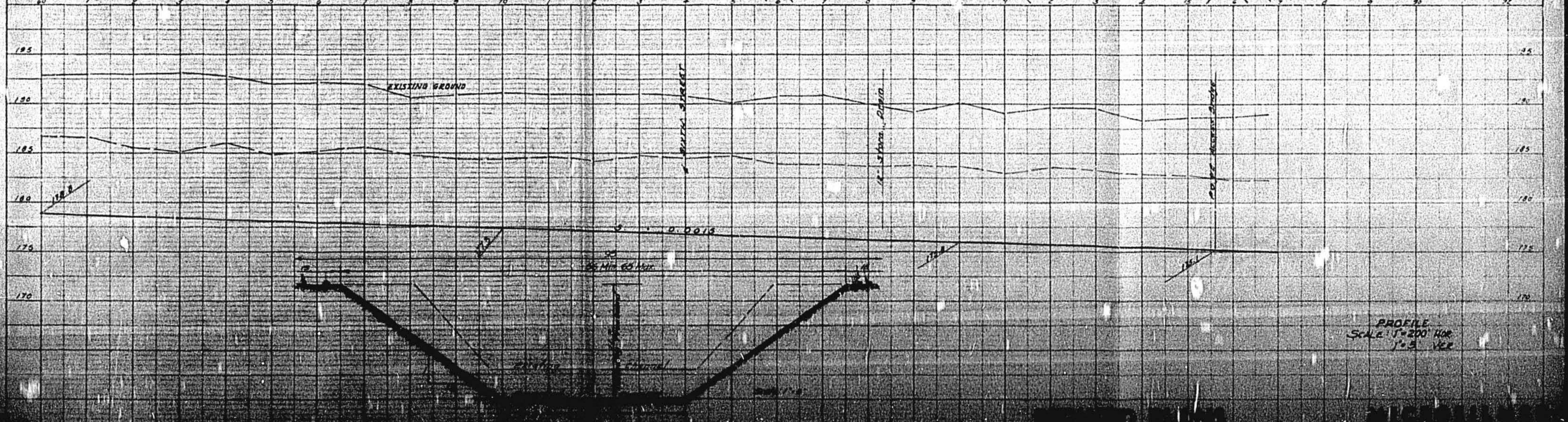

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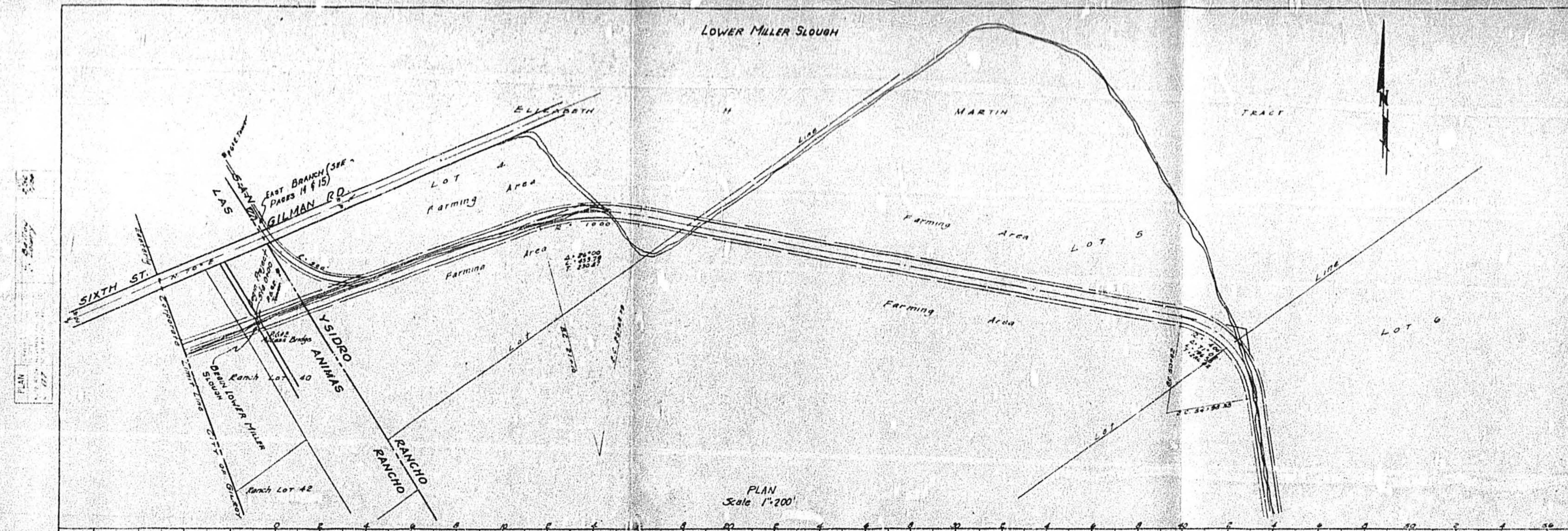

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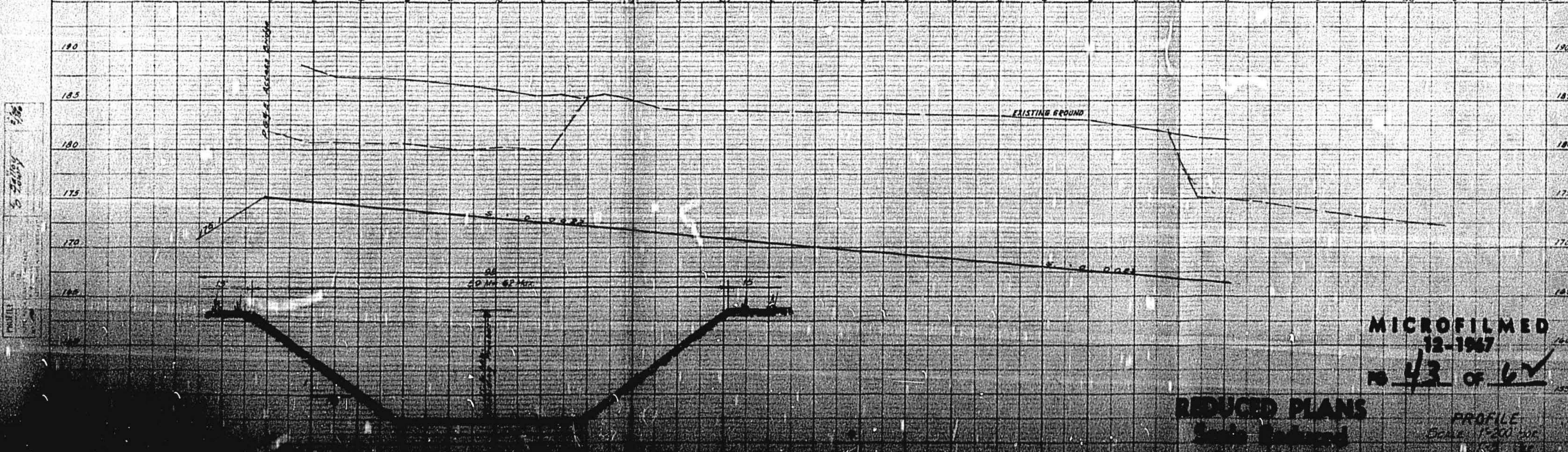

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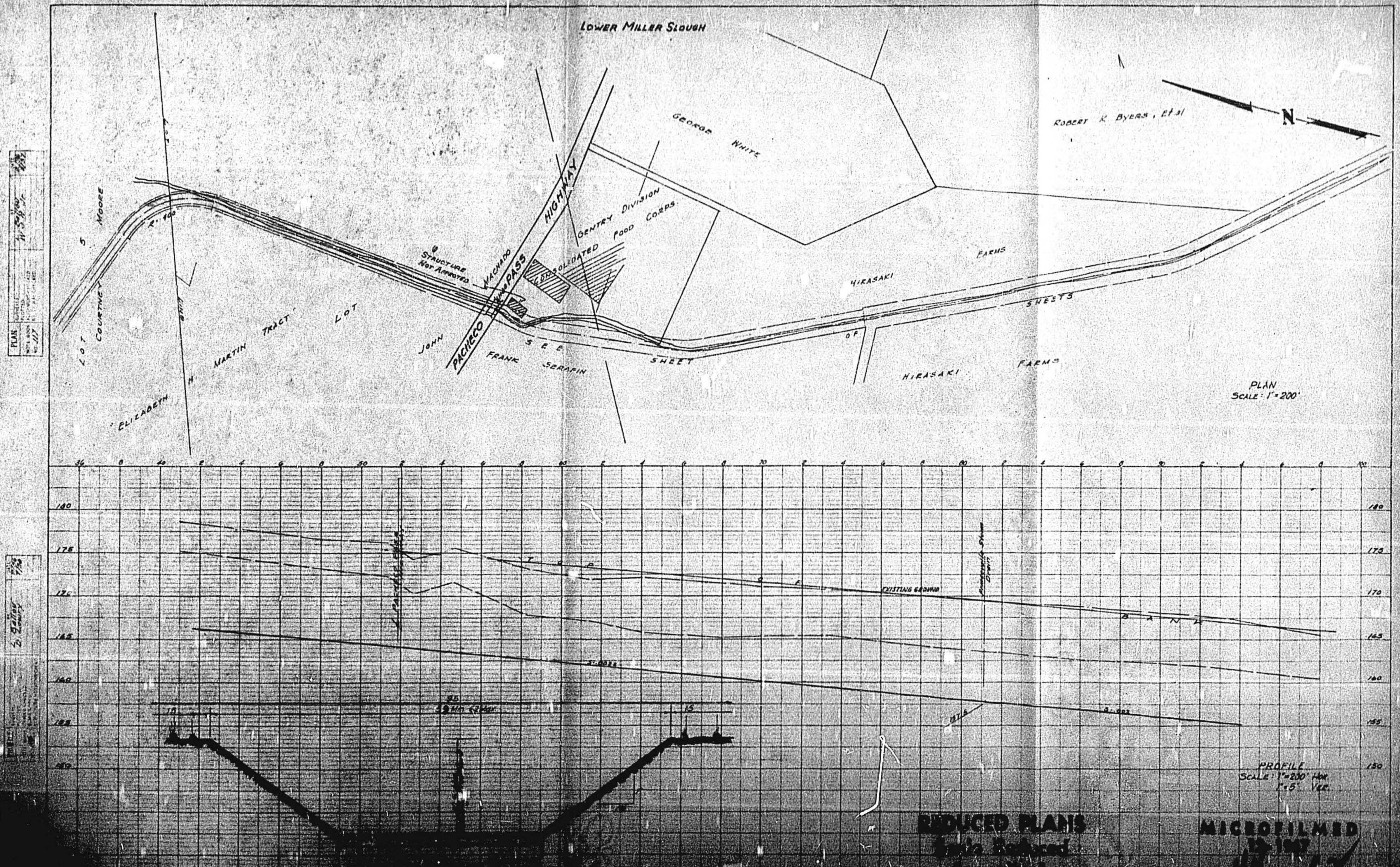

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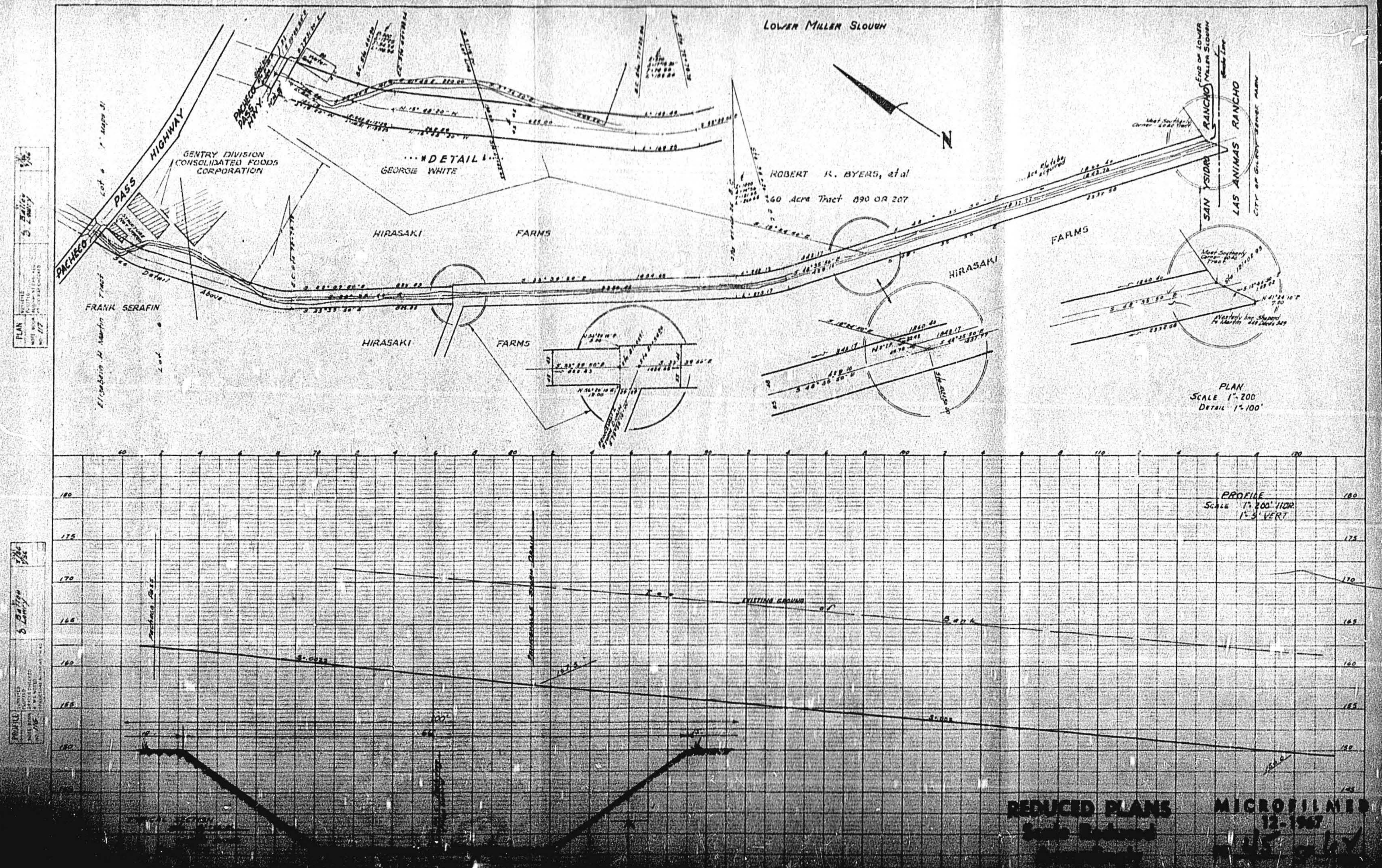

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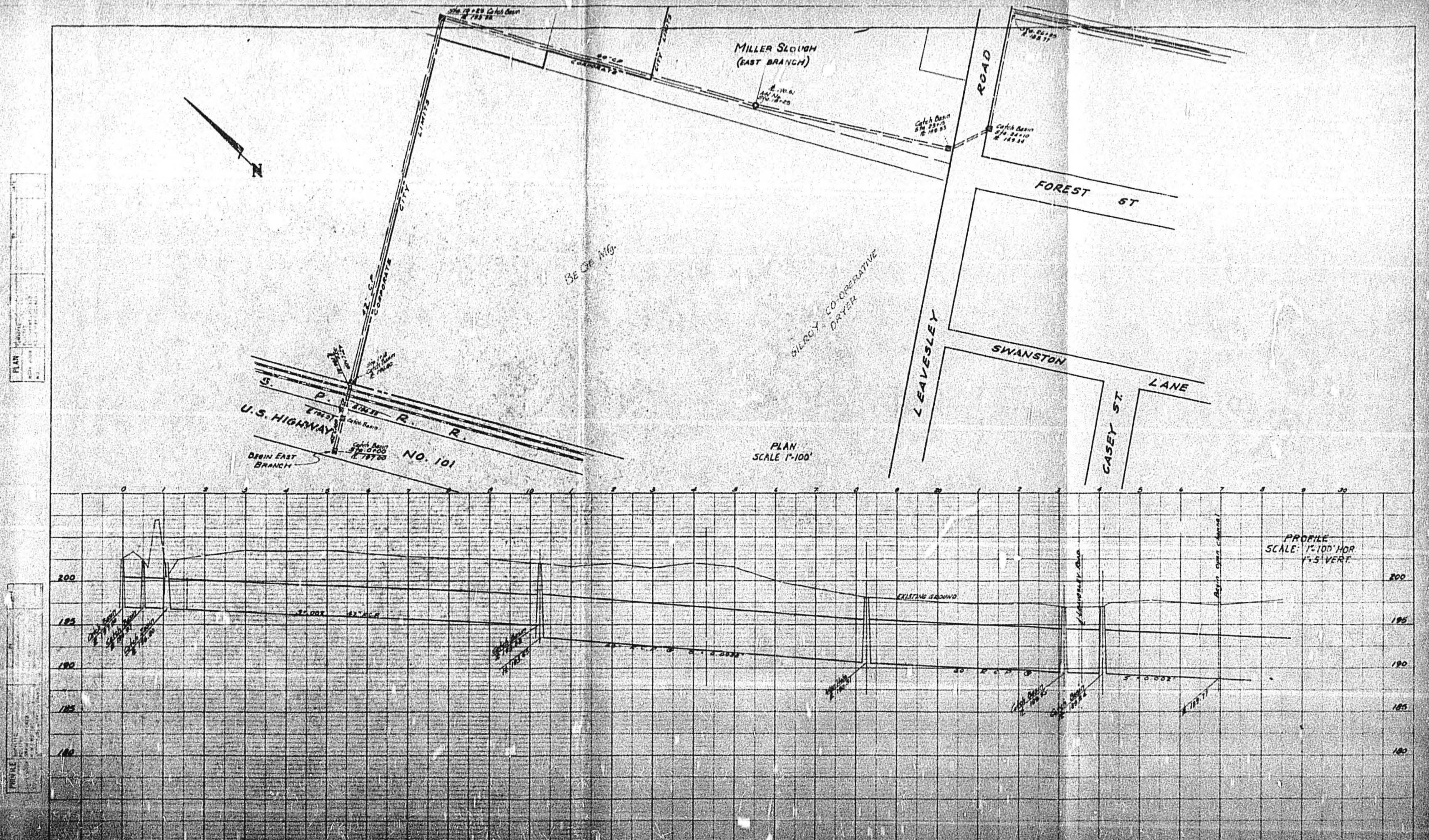

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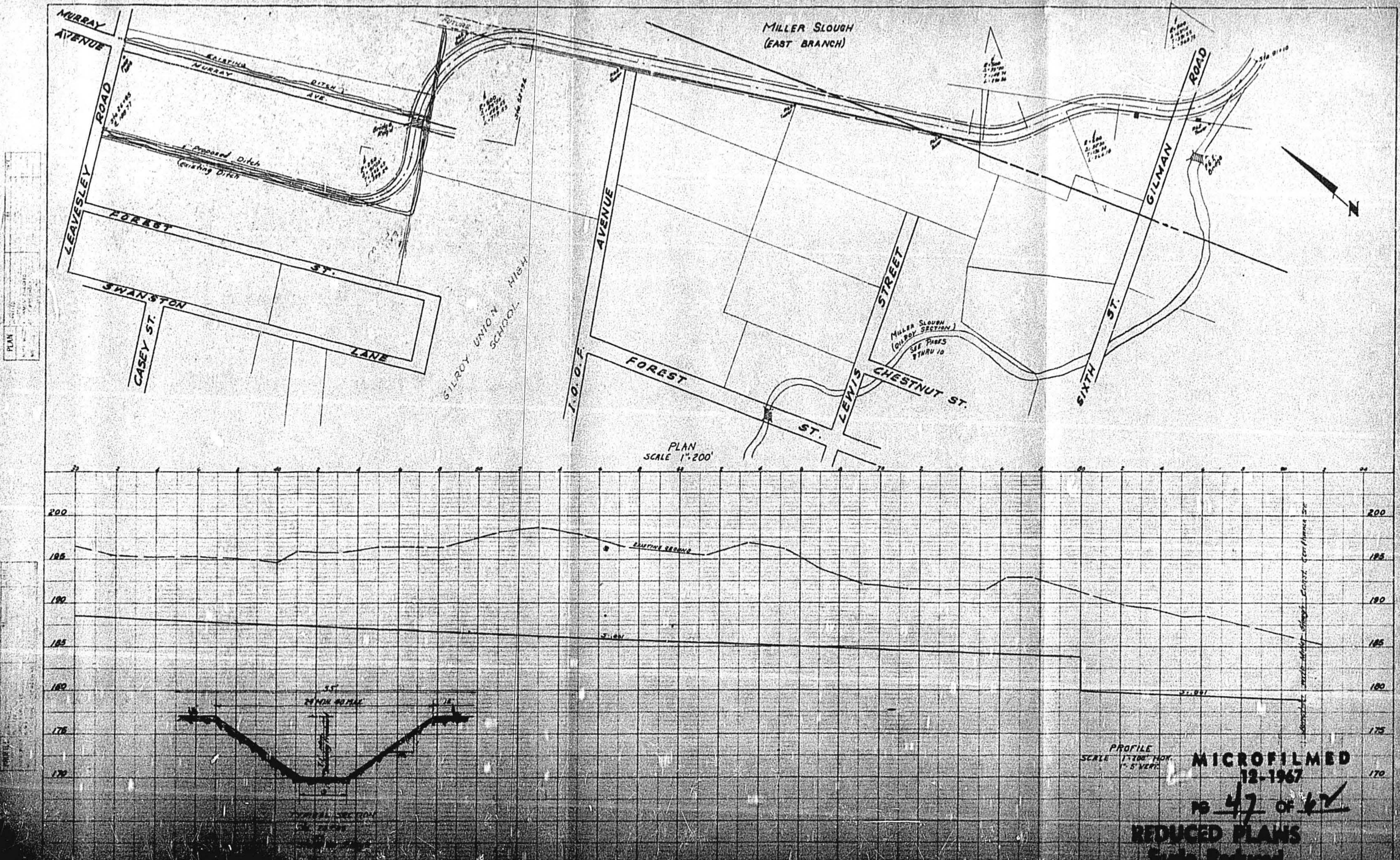

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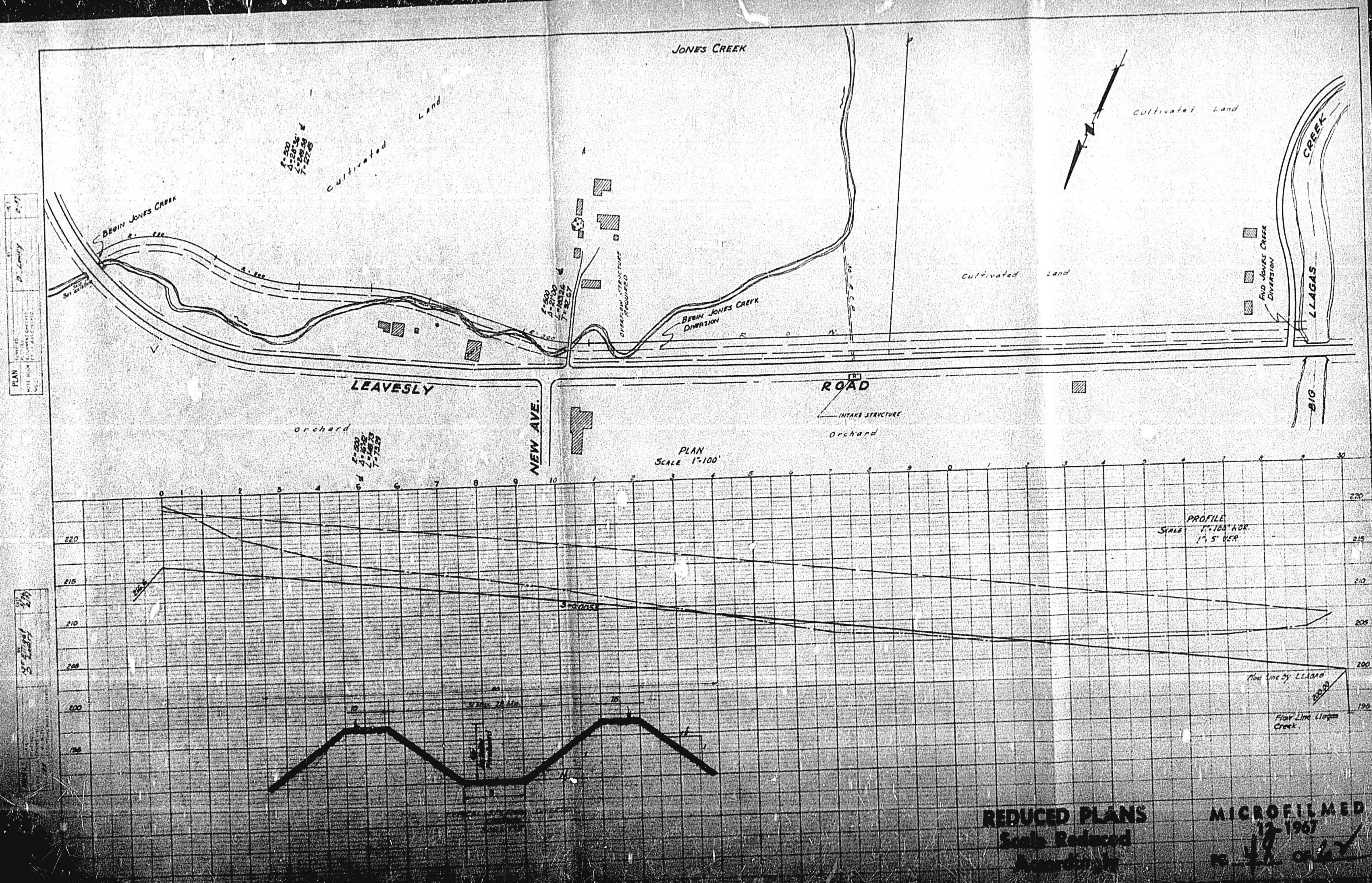

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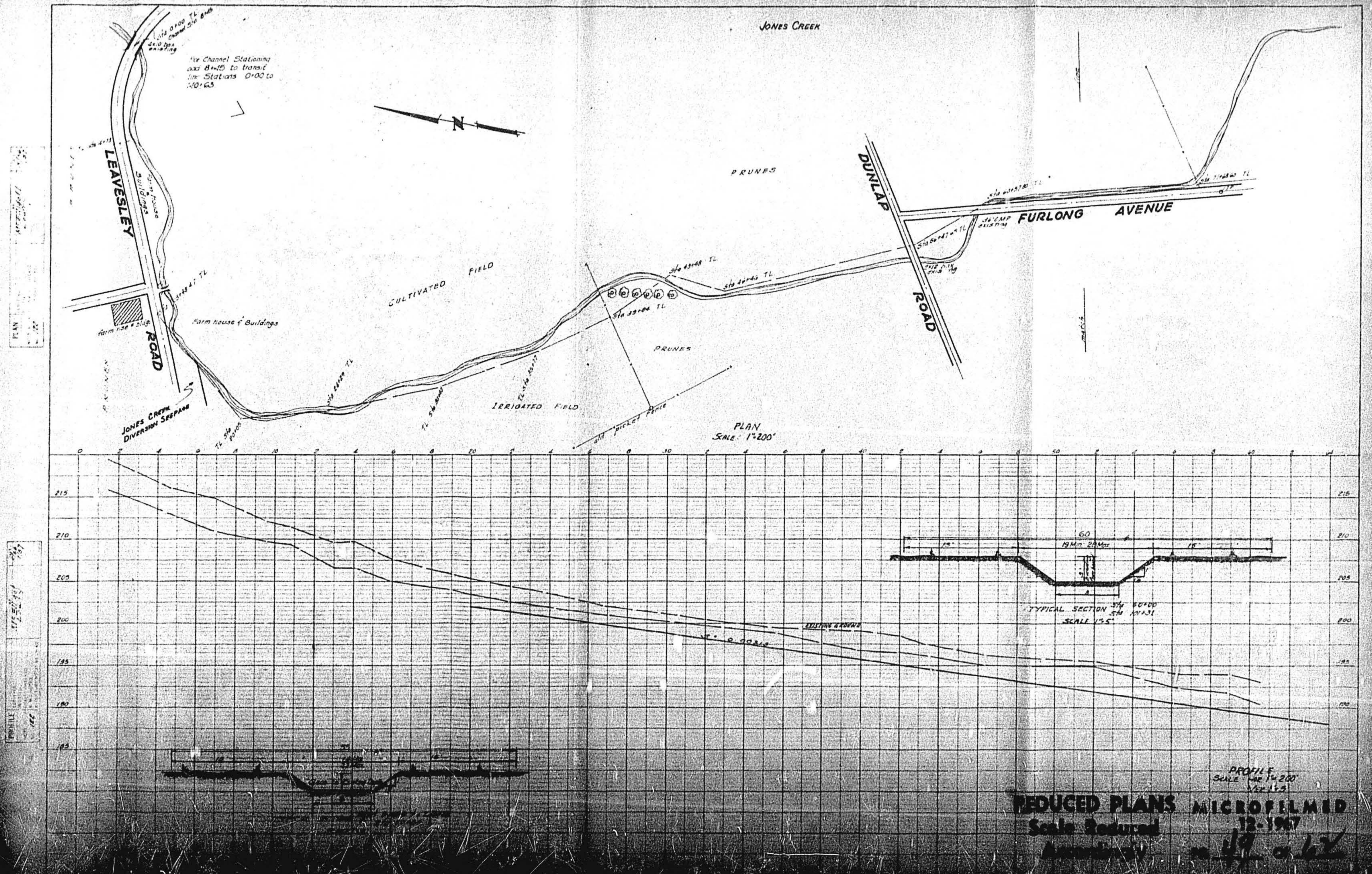

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MICRODEX CORRECTION GUIDE (M-9)

CORRECTION

The preceding document has been re-photographed to assure legibility and its image appears immediately hereafter.

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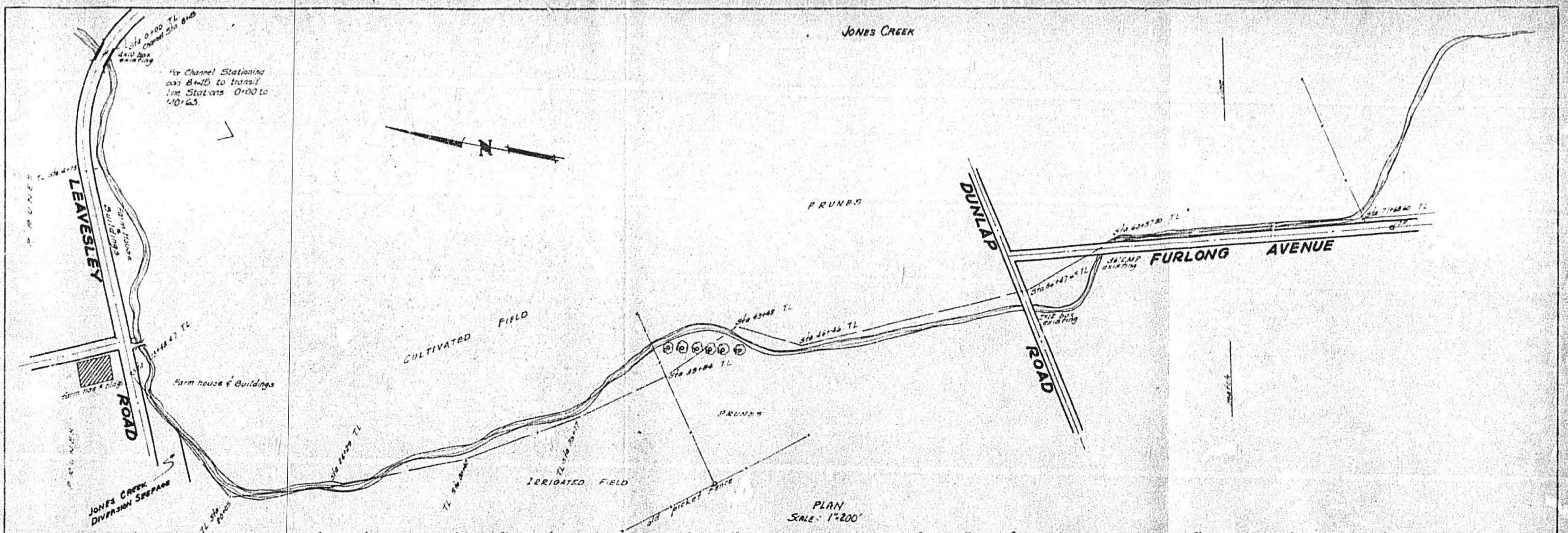

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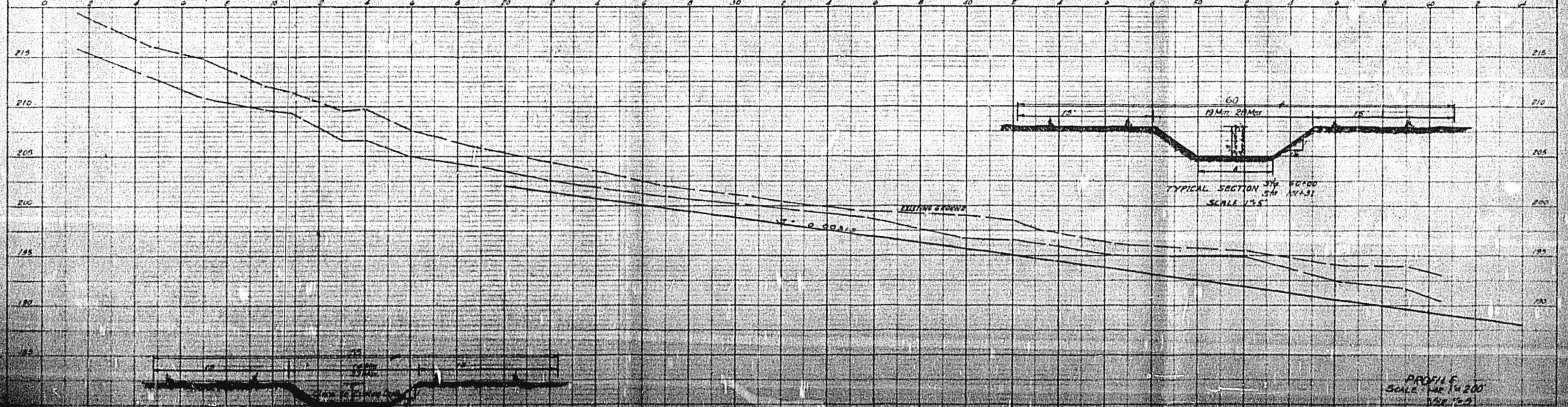

TYPICAL SECTION Sta 60+00
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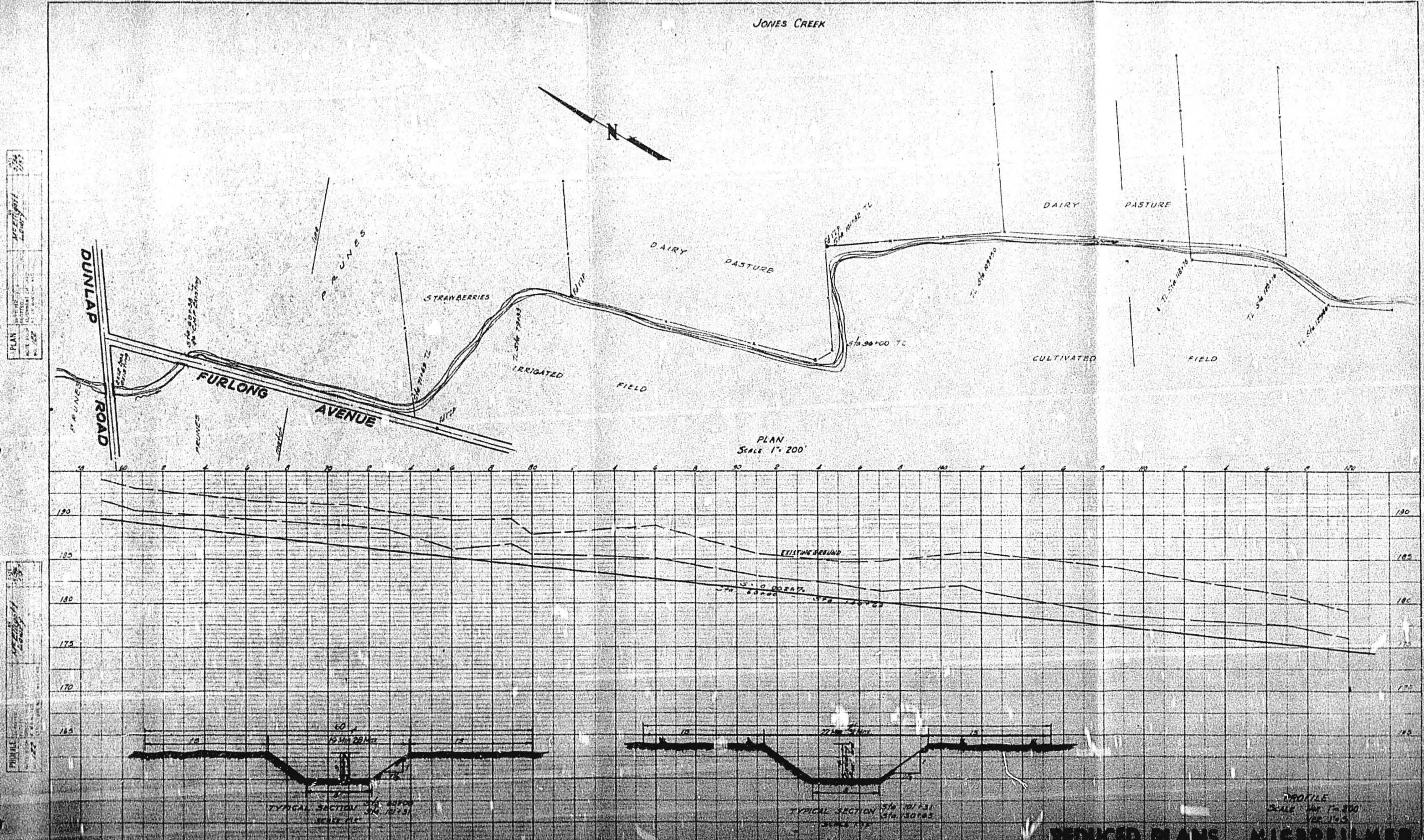

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TYPICAL SECTION Sta 60+00 – Sta 101+31
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TYPICAL SECTION Sta 101+31 – Sta 130+05
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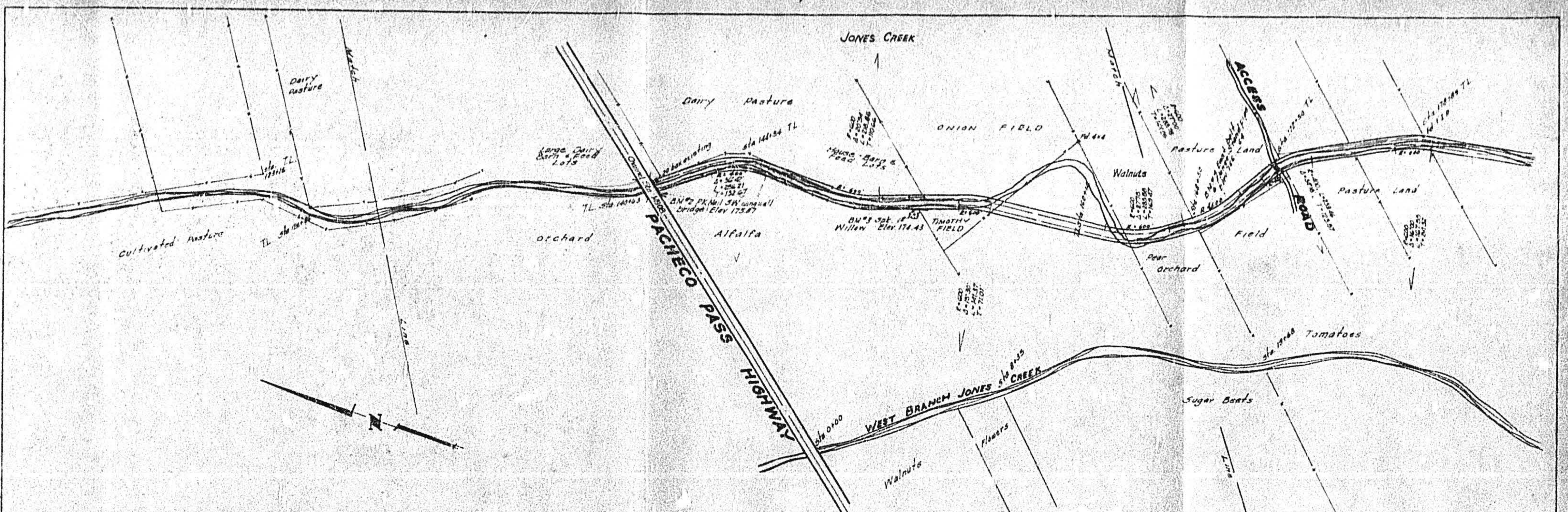

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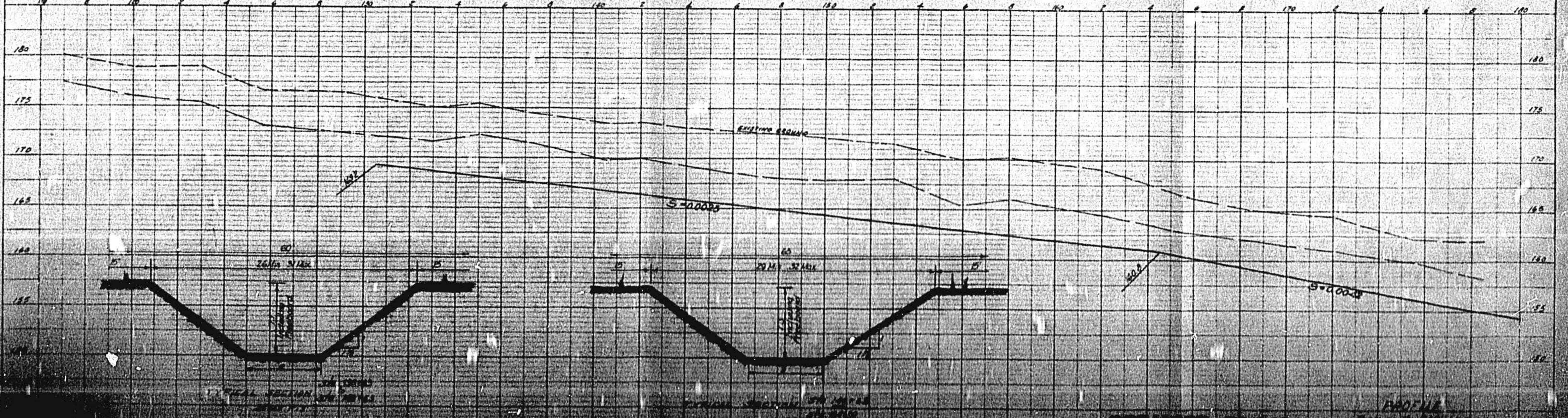

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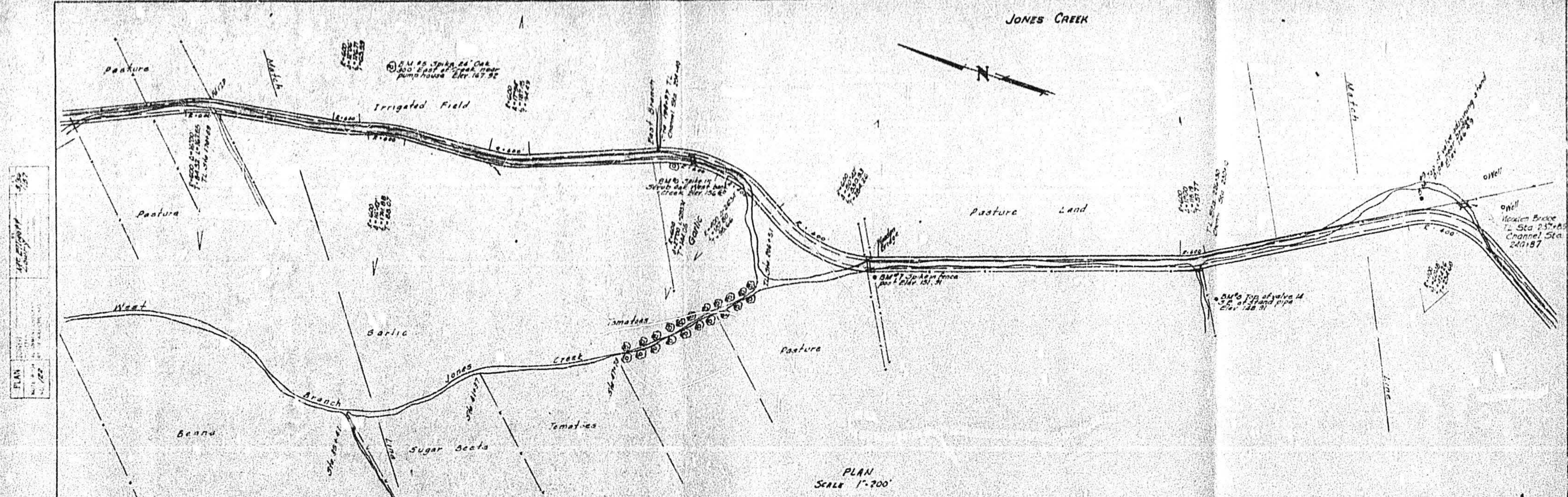
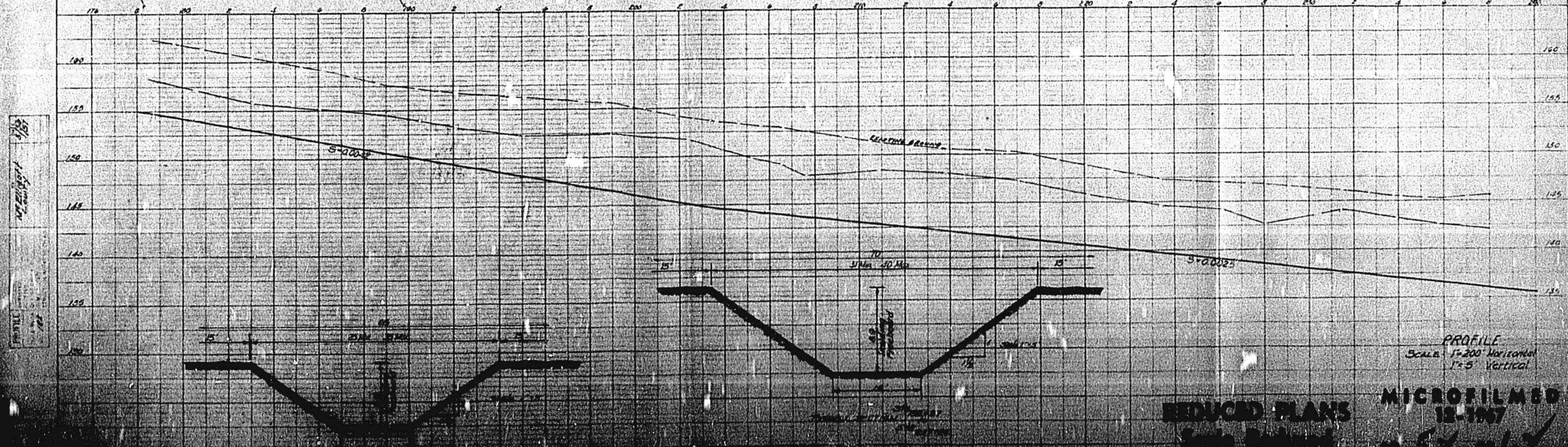

JONES CREEK
N
Pasture
Irrigated Field
Match
BM #5 Spike 24" Oak 300' East of Creek near pump house Elev. 167.92
East Branch
BM #6 Spike in Scrub Oak West bank Creek Elev. 156.60
Pasture
Garlic
Tomatoes
Pasture
Pasture Land
Meaden Bridge
BM #7 Spike in fence post Elev. 151.91
BM #8 Top of valve 14 S.E. of stand pipe Elev. 148.91
Well
Meaden Bridge
T.L. Sta 237+85
Channel Sta 240+87
West
Branch
Jones
Creek
Beans
Sugar Beets
Tomatoes
Match
Line
PLAN

PLAN
Scale 1" = 200'



PROFILE
Scale 1" = 200' Horizontal
1" = 5' Vertical

REDUCED PLANS
Scale Reduced

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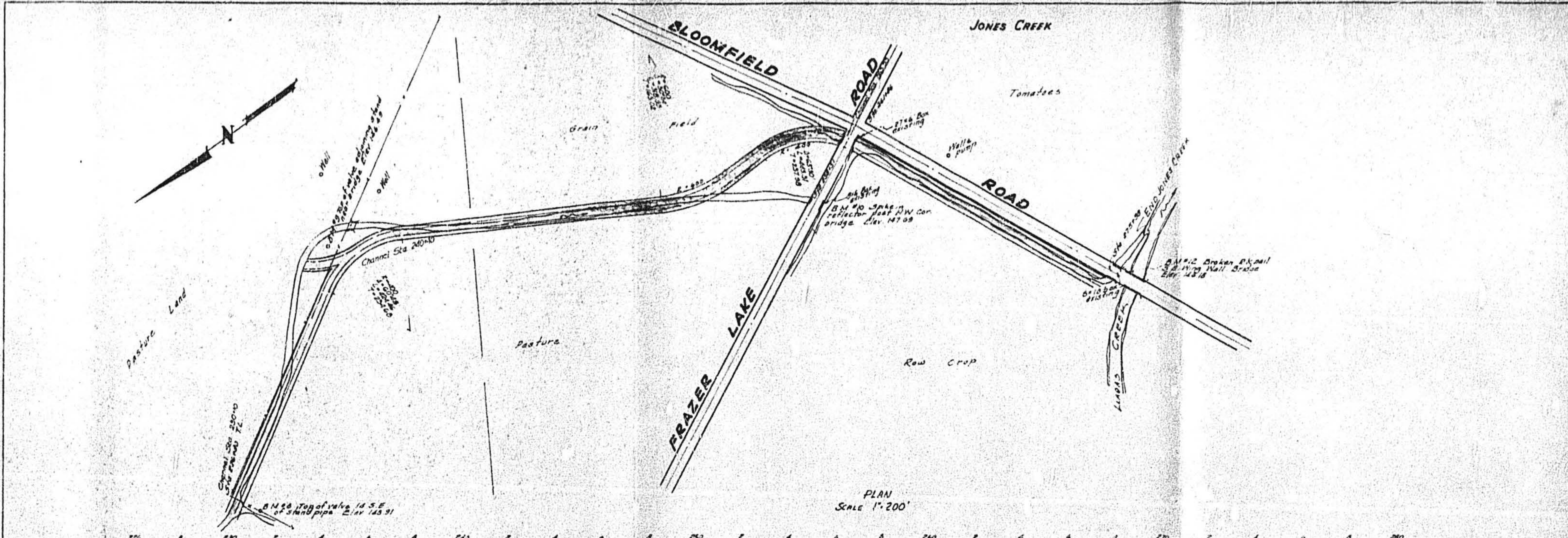
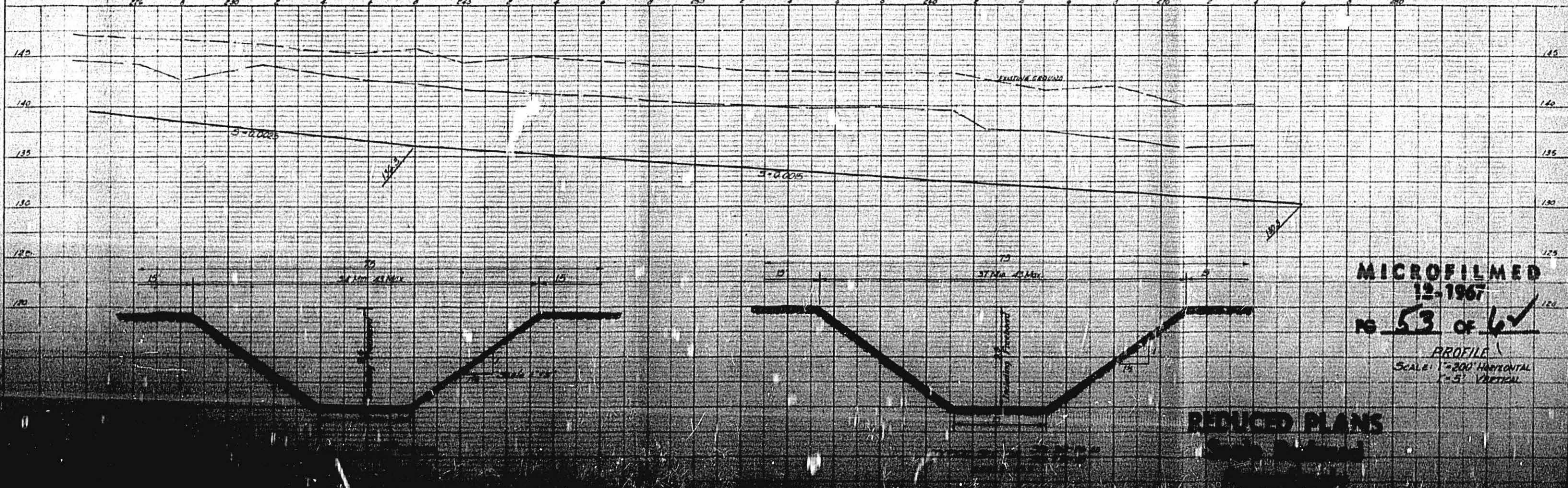
12-1967
no 54 of 64



PLAN
Scale 1"=200'



PROFILE
Scale: 1"=200' Horizontal
1"=5' Vertical

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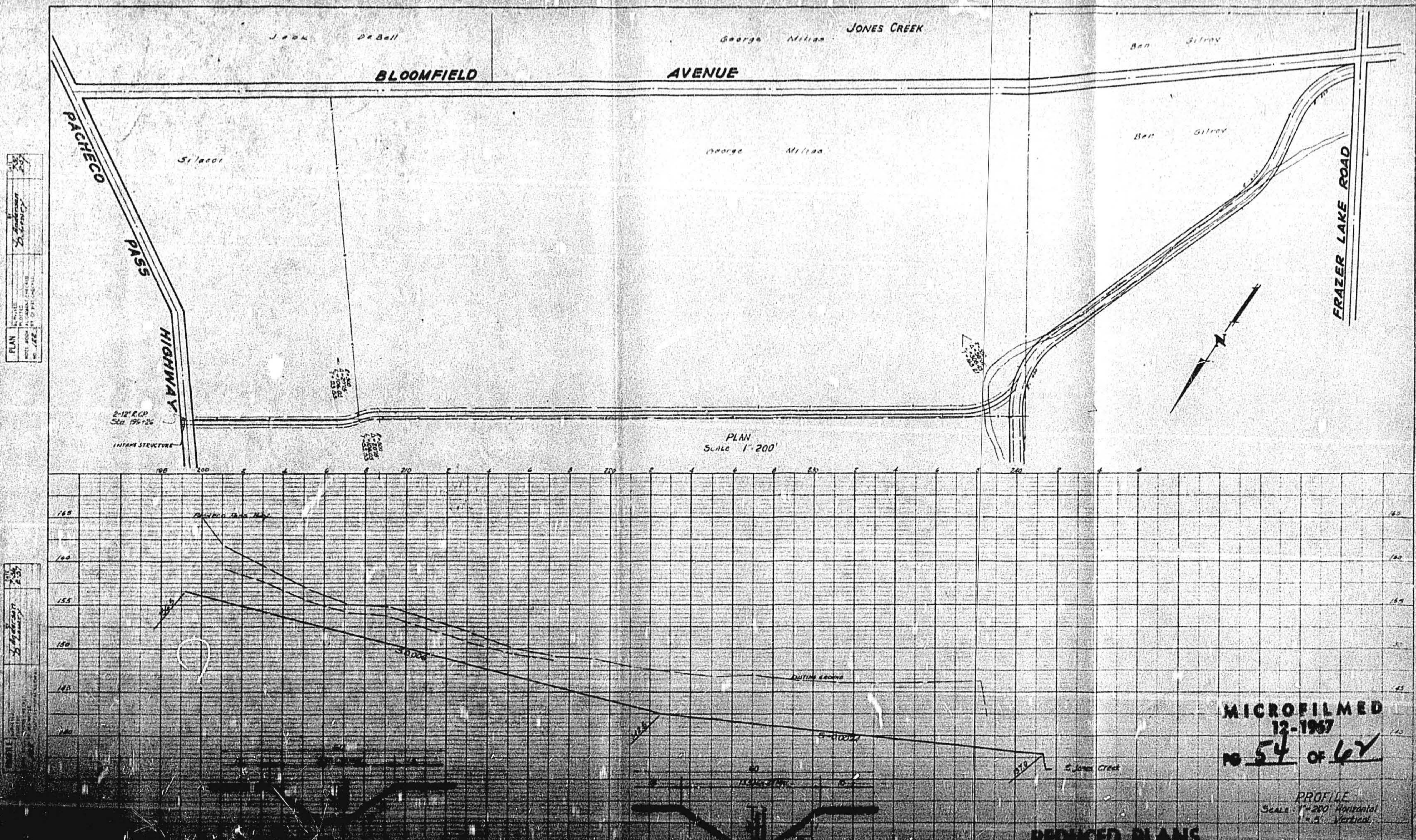
PG 53 OF 64 ✓

REDUCED PLANS



PROFILE
Scale: 1" = 200' Horizontal
1" = 5' Vertical

MICROFILMED
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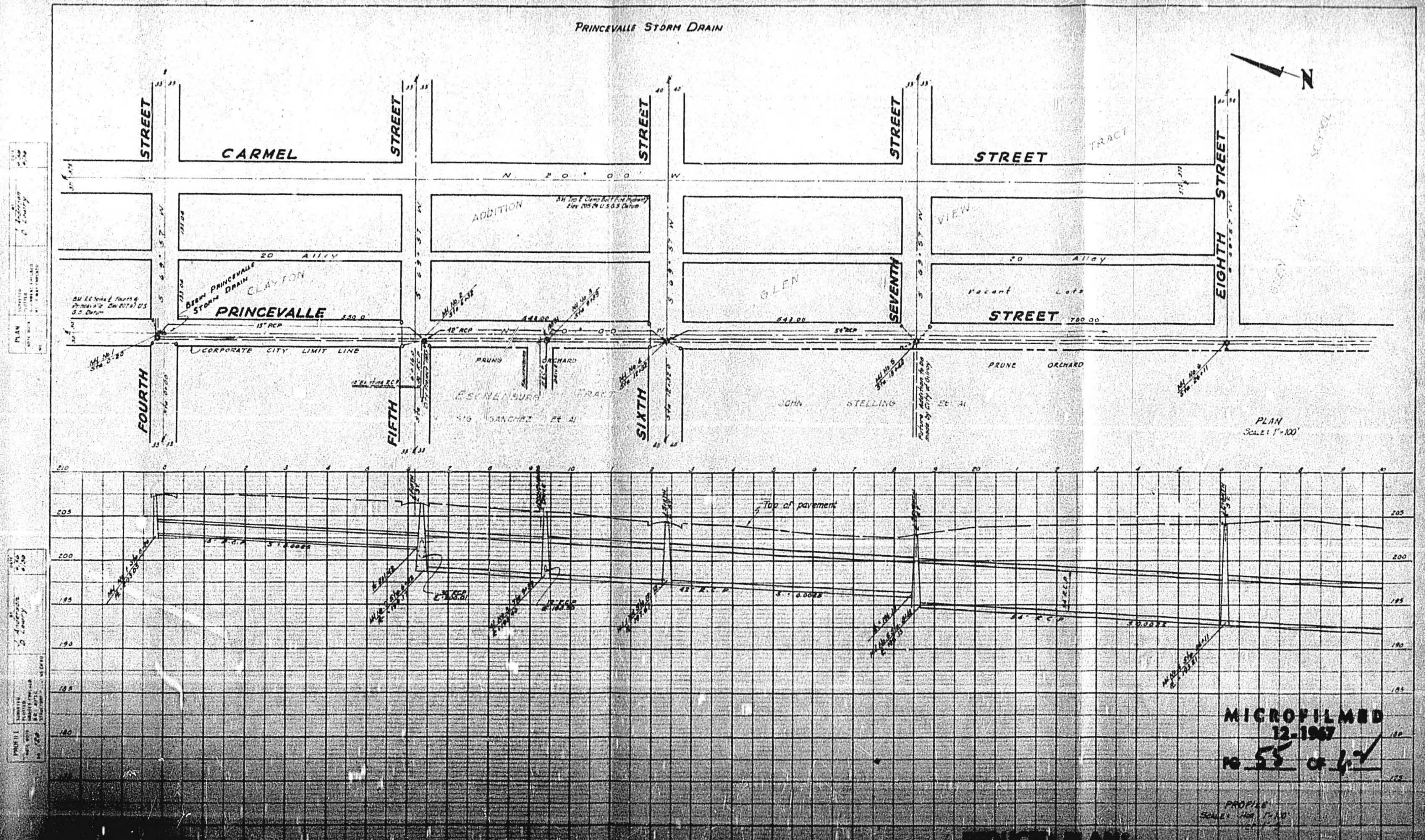
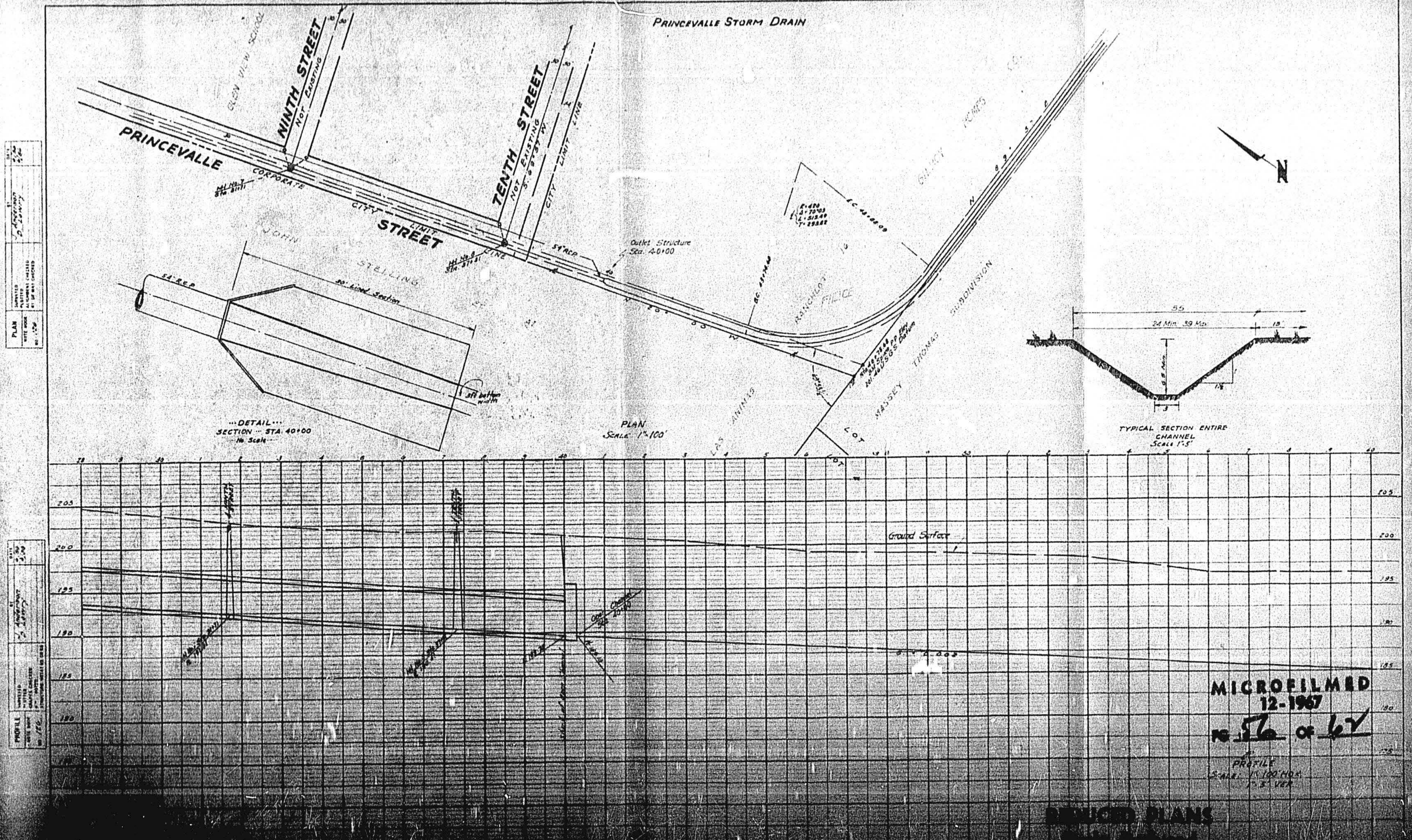
REDUCED PLANS
Scale Reduced


PRINCEVALLE STORM DRAIN

MICROFILMED
12-1967
PG 55 OF 6[illegible]

PRINCEVALLE STORM DRAIN



...DETAIL...
SECTION - STA. 40+00
No Scale

PLAN
SCALE 1" = 100'

TYPICAL SECTION ENTIRE CHANNEL
Scale 1" = 5'

PROFILE
Scale: 1" = 100' HOR.
1" = 5' VER.

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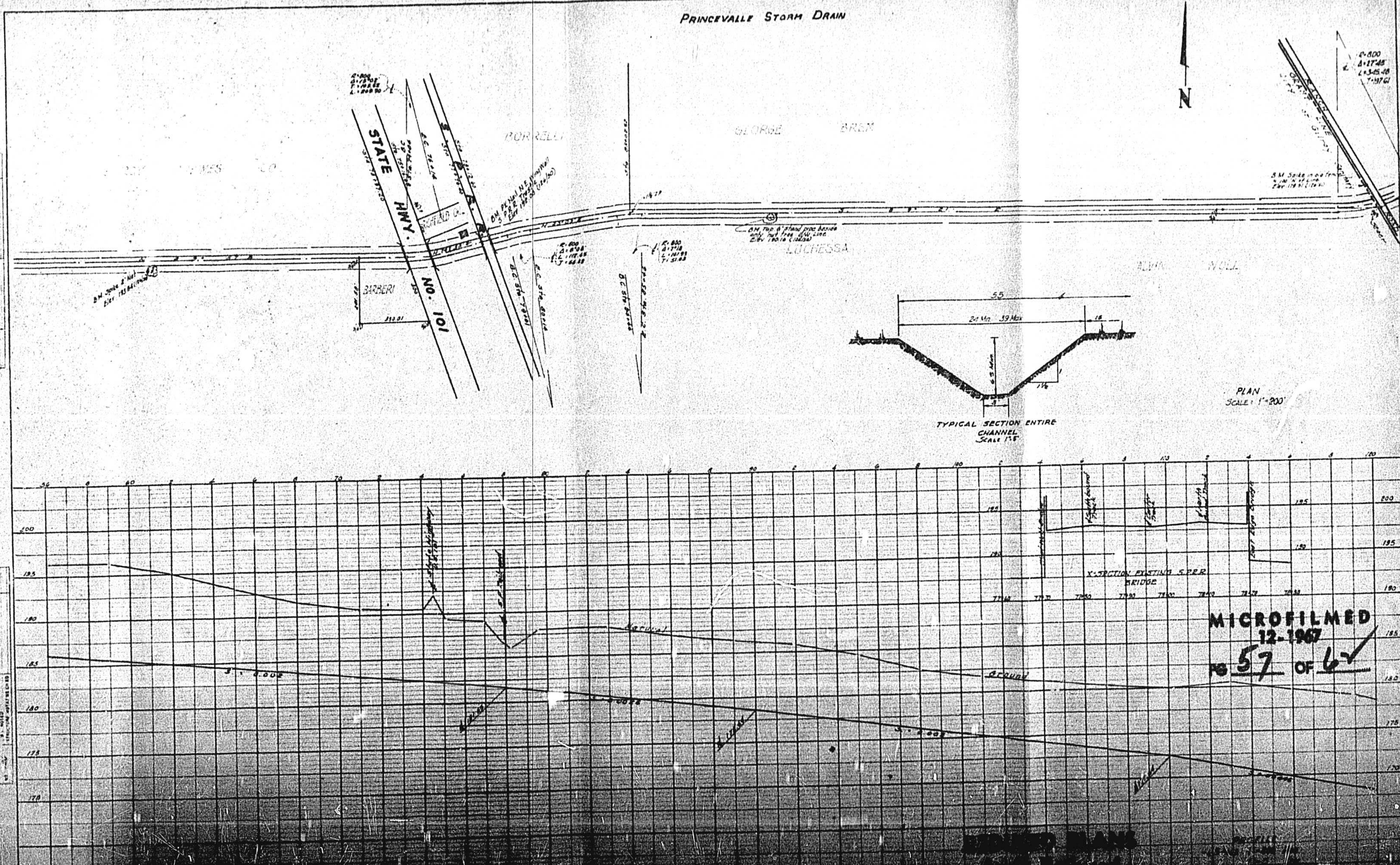
REDUCED PLANS

PRINCEVALLE STORM DRAIN



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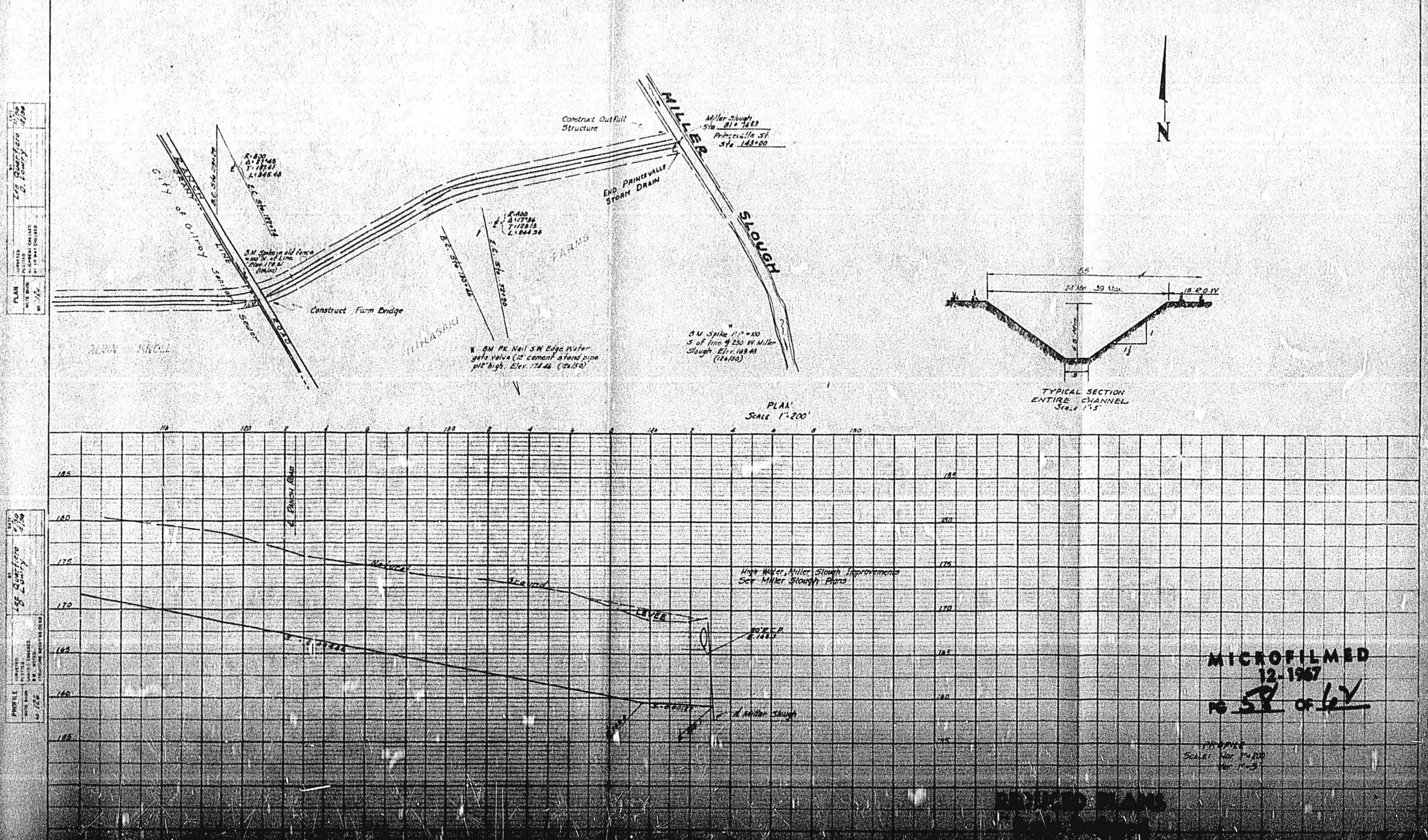
PRINCEVALLE STORM DRAIN



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12-1967
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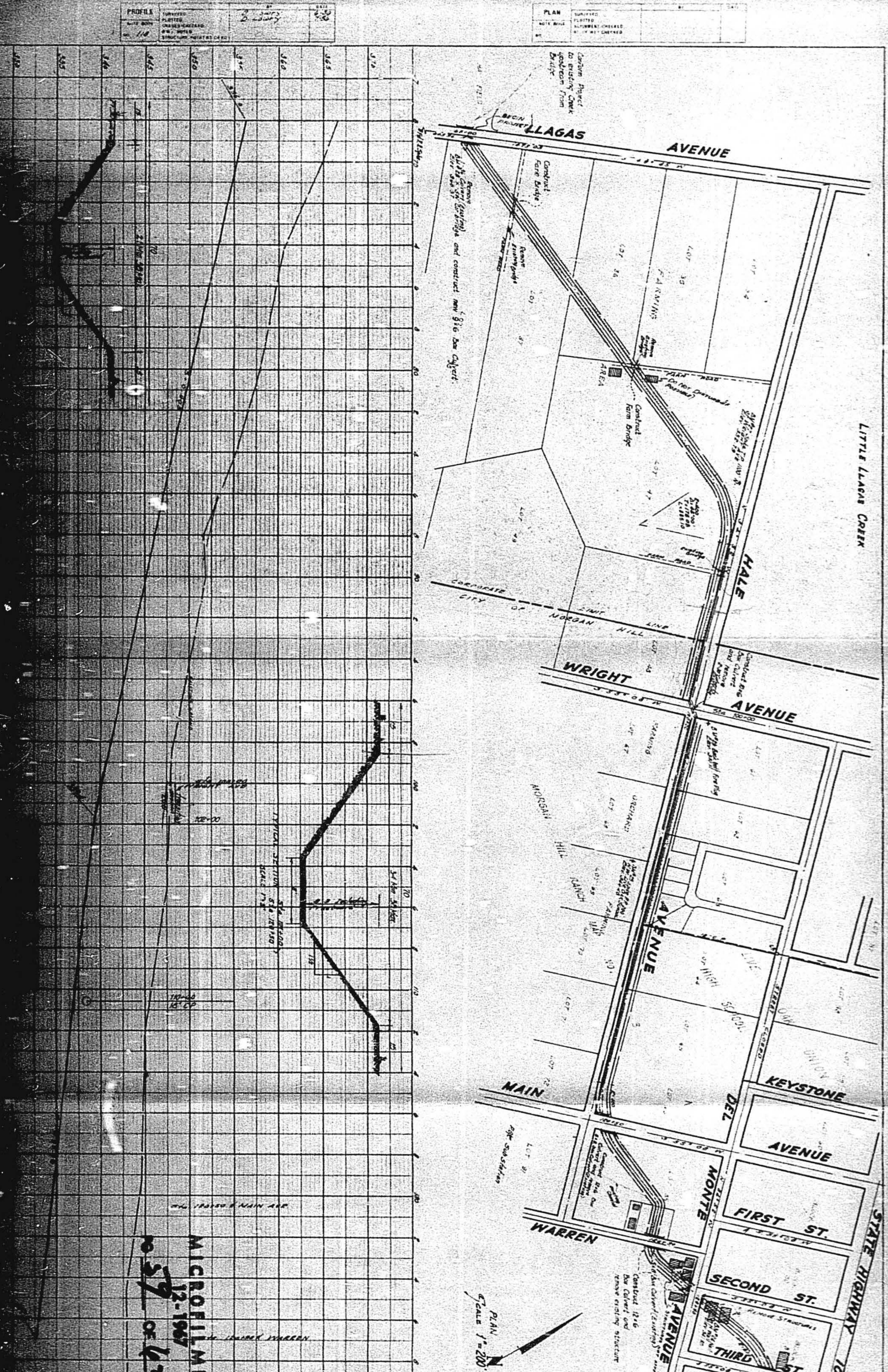

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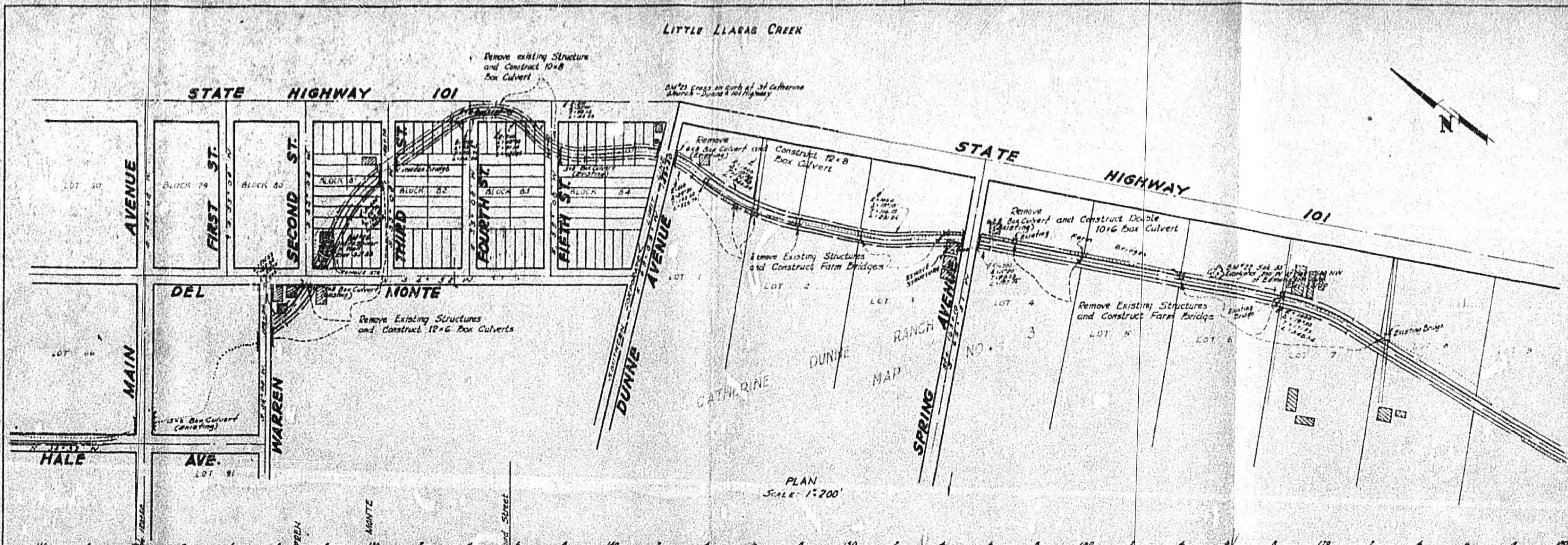
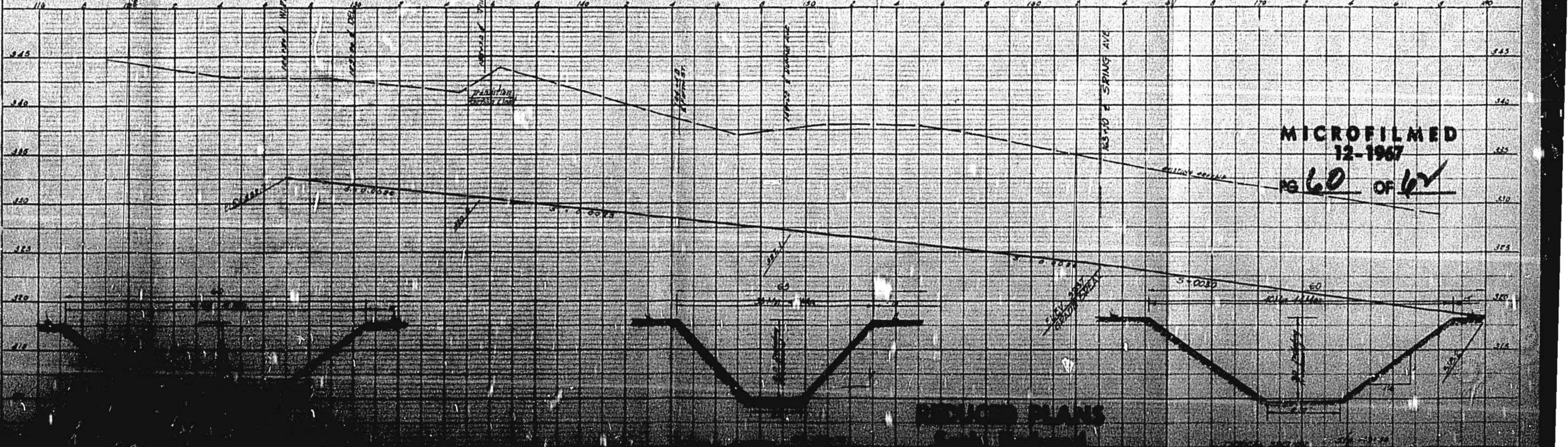
12-1967
No 37 OF 64


LITTLE LLAGAS CREEK
STATE HIGHWAY 101
Remove existing Structure and Construct 10×8 Box Culvert
MAIN AVENUE
FIRST ST.
SECOND ST.
THIRD ST.
FOURTH ST.
FIFTH ST.
BLOCK 79
BLOCK 80
BLOCK 81
BLOCK 82
BLOCK 83
BLOCK 84
LOT 90
LOT 66
LOT 91
DEL MONTE
HALE AVE.
WARREN
Remove Existing Structures and Construct 12×6 Box Culverts
DUNNE AVENUE
Remove Box Culvert and Construct 12×8 Box Culvert
Remove Existing Structures and Construct Farm Bridges
SPRING AVENUE
Remove Box Culvert and Construct Double 10×6 Box Culvert
Remove Existing Structures and Construct Farm Bridge
Existing Bridge
CATHERINE DUNNE RANCH MAP NO. 3
LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
N

PLAN
Scale: 1"=200'



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12-1967
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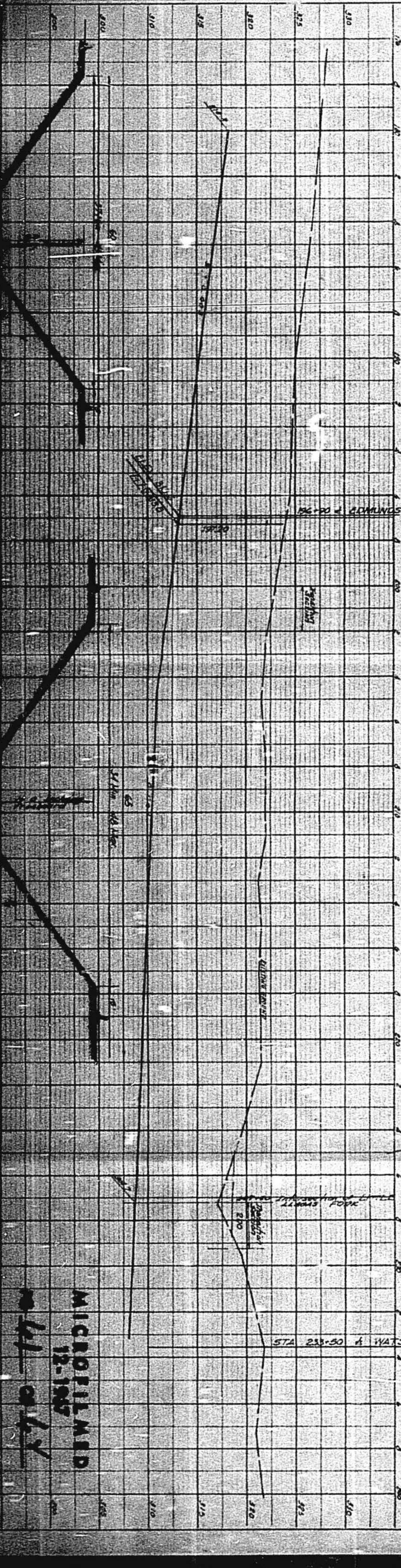
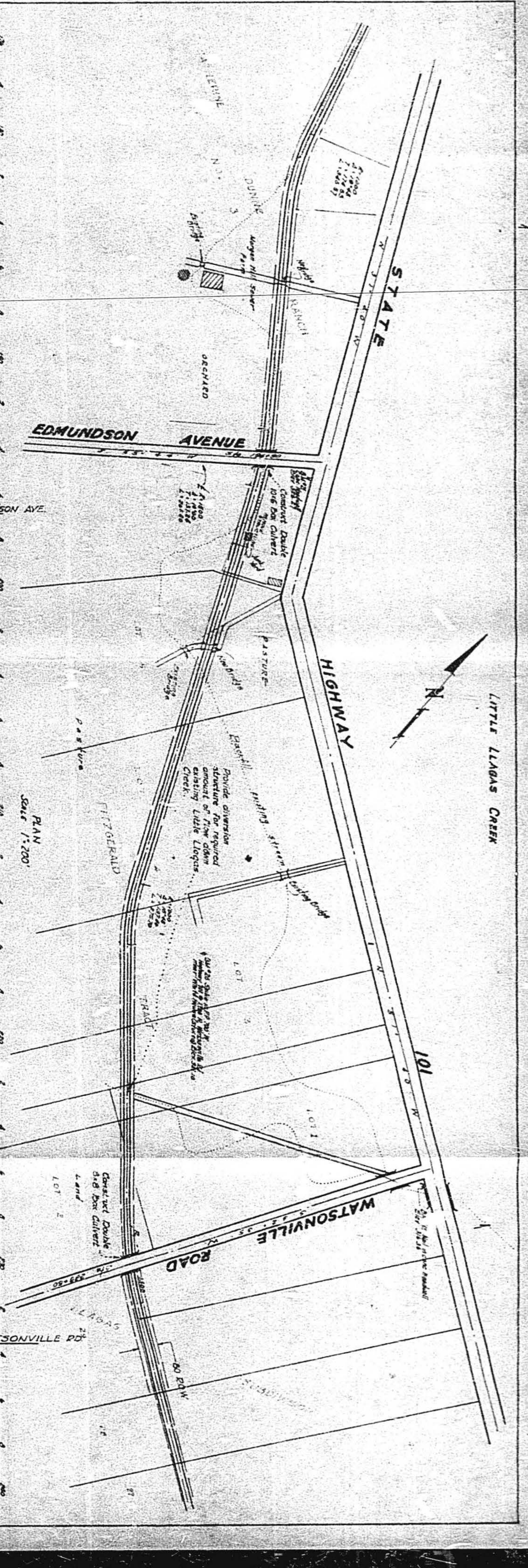
REDUCED PLANS

PROFILE		BY	DATE
NOTE BOOK	SURVEYED	D. Lowry	8/56
NO. 118	PLOTTED	D. Lowry	8/56
	GRADES CHECKED		
	B.D. & NOTES		
	STRUCTURE NOTATIONS CH'KD		

PLAN		BY	DATE
NOTE BOOK	SURVEYED		
NO.	PLOTTED		
	ALIGNMENT CHECKED		
	RT. OF WAY CHECKED		





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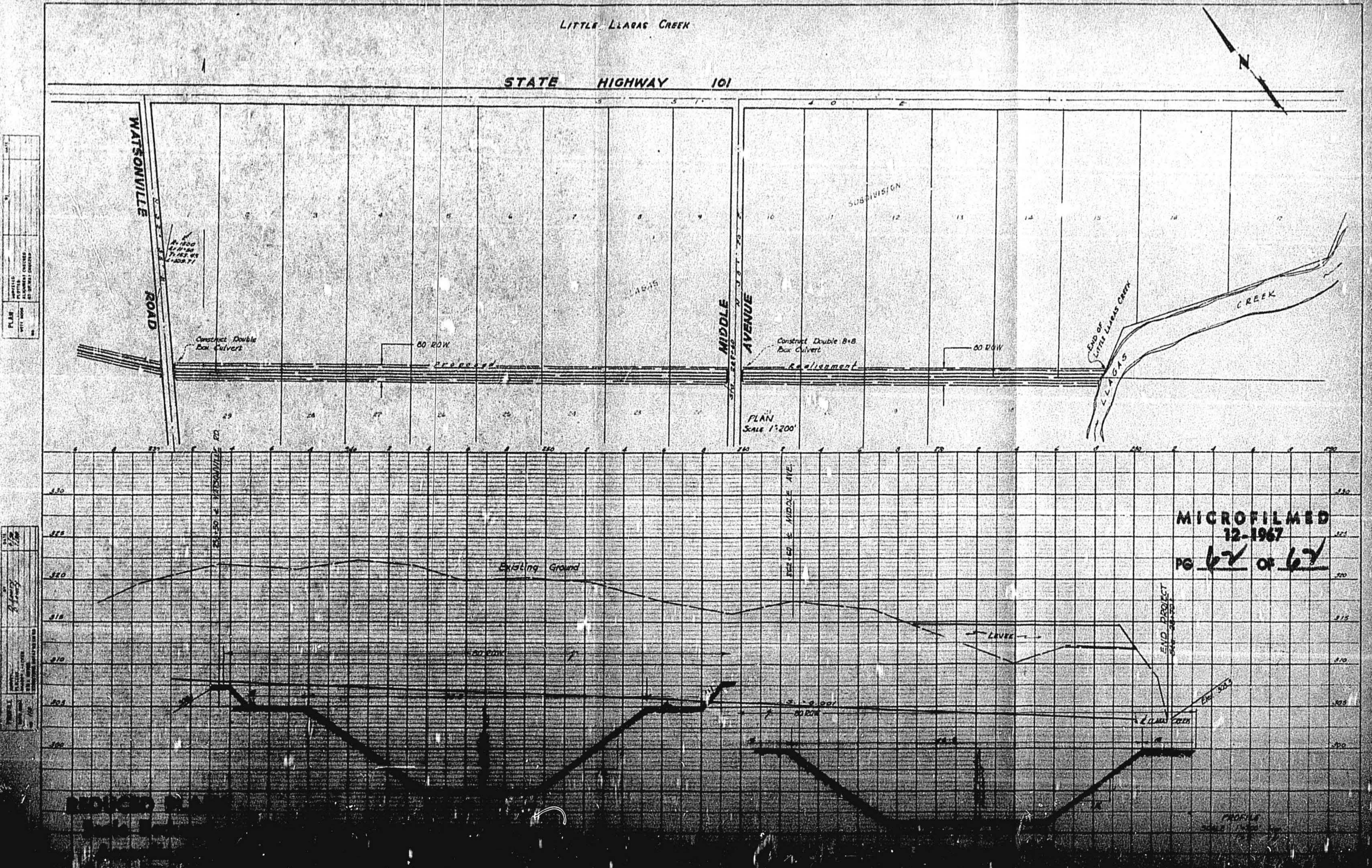
#44 of 44



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12-1967
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